DOCTOR OF PHILOSOPHY

Exploring the Socio-environmental context in the Prevalence and Management of Asthma at Scottish General Practices

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List of Abbreviations

BTS British Thoracic Society

ETS Environmental Tobacco Smoke

ISD Information Services Division Scotland

NCD Non Communicable Diseases

NO_2 Nitrogen Dioxide

PM10 Particulate Matter

QOF Quality Outcomes Framework

SIGN Scottish Intercollegiate Guidelines Network

SIMD Scottish Index of Multiple Deprivation

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Declaration

I, Shiraz Sheriff, am the author of this thesis; that, unless otherwise stated, all references cited have been consulted by the author; that the work of which the thesis is a record has been done by the author; and that it has not been previously accepted for a higher degree.

Signature: Shiraz Sheriff

I, as Principal Supervisor, confirm that the conditions of the relevant Ordinance and Regulations have been fulfilled.

Signature: Dr. Edward Hall

Abstract

Thesis Title**:** Exploring the Socio-environmental Context in the Prevalence and Management of Asthma at Scottish General Practices.

Worldwide, asthma is a chronic condition which is prevalent and neglected and Scotland has a high prevalence of asthma compared to the rest of the world. In their report on the global burden of asthma, the Global Initiative for Asthma (GINA) Program ranks Scotland as having the highest asthma prevalence in the world, with almost one in every five people affected and 6.3 % of the population in Scotland are seeking treatment at General Practices. The aetiology of asthma is complex and it remains a persistent and chronic problem affecting many people, and prevention and treatment are not working. This thesis makes a unique contribution utlising an interdisciplinary approach from Geography and Public Health to explore the nature and role of the socio-environmental context in relation to the prevalence and management of asthma at Scottish General Practices located in areas of dissimilar deprivation levels. The key focus of the research is the way that health professionals (and related stakeholders) understand the factors that shape the causation and prevalence of asthma (including social and environmental contexts), and how this in turn shapes their management of the condition in their practice.

Aim: The overall aim of this research is identify, understand and interpret the nature and role of the socio-environmental context in relation to asthma prevalence and management at the Scottish primary care setting.

Methods: The research employed quantitative analysis of a secondary dataset on asthma and a case study analysis of two General Practices located in areas of dissimilar deprivation levels in Scotland. Practices were selected after quantitative data analysis comparing the deprivation scores (SIMD) against crude prevalence rates of asthma. The case study employed in-depth semi-structured interviews with stakeholders involved in asthma care.

The results of the study contributed to the understanding of what a conventional deprivation measure does/ does not reveal about asthma–place contexts. It also gave insights on how health professionals perceived their area, patient population and how they integrated these perceptions it into their practice as their understanding or lack of understanding or their inability to act upon their understanding on the importance of the socio-environmental context was one of key factors that shape their management of asthma. The study concluded imparting policy implications and renewed approaches to asthma care and management practices within the Health Services.

Chapter One

Introduction

This thesis explores the nature and role of the socio-environmental context in relation to the prevalence and management of asthma at Scottish General Practices. The key focus of the research is the way that health professionals (and related stakeholders) understand the factors that shape the causation and prevalence of asthma (including social and environmental contexts), and how this in turn shapes their management of the condition in their practice.

Worldwide, asthma is a chronic condition which is prevalent and neglected (Pearce et al. 2013) and Scotland has a high prevalence of asthma compared to the rest of the world (SCOT PHO 2012). In their report on the global burden of asthma, the Global Initiative for Asthma (GINA) Program ranks Scotland as having the highest asthma prevalence in the world, with almost one in five people affected (Masoli et al. 2004).

Most applied research on asthma has been concentrated on clinical management outcomes that include medication efficacy (Szefler et al. 2008; Nowak, 2006; Juniper et al. 1990), individual behaviours like medication uptake (Coutts et al. 1992; Powell et al. 2001), inhaler techniques (Hilton 1990; van Beerendonk et al. 1998), especially the links to smoking (Stapleton et al. 2011; Althuis et al. 1999; Piipari et al. 2004), its relation to triggers from the physical environment like Ozone (Rage et al. 2009; Neidell & Kinney 2010), Pollen (Feo Brito et al. 2010), Particulate Matter (Nastos et al. 2010) etc. and predominantly deprivation in the social environment (Burr et al. 1997; Salmond et al. 1999; Basagaña et al. 2004; Gale et al. 2011).

It can be seen that research on asthma (causation/prevalence) have been highly individually focused e.g. clinical management studies, lifestyle and health risk behaviour studies (smoking); and on studies considering the physical, natural environment and its relation to asthma e.g. environmental triggers and links to deprivation. Most studies utilised secondary care data like hospital admission rates of asthma to link with clinical management outcomes, environmental variables or deprivation statistics but not many studies concentrated at the primary care level where the disease is primarily managed.

What is missing is a clearer understanding of the collective influence of the socio-environmental context in the prevalence and management of asthma and how it was taken into consideration by health practitioners at the primary care level who are at the forefront of asthma care, as asthma remains a persistent and chronic problem affecting many people, and prevention and treatment are not working. This is where this thesis makes a contribution. This research takes a unique perspective to explore the way in which all of these elements are understood and responded to by health professionals in the local areas they work in.

Throughout this thesis, evidence will be presented on how the socio-environmental context- the hitherto neglected domain in asthma research, impact asthma prevalence and management. First, the literature review undertaken in Chapter 2 will add to the understanding on the importance of the socio-environmental context by exploring the connections/linkages between the socio-environmental context and health with a particular emphasis on asthma and the healthcare responses to asthma management. The research then proceeds to analyse the asthma-deprivation relationship in Chapter

4, as deprivation (representing a range of socio-economic factors) has been the focus of so many previous studies– the chapter explores in detail how the different measures of deprivation (and hence a range of socio-economic factors) are related to asthma prevalence; and broadens the analysis of asthma from a focus on deprivation to an appreciation of numerous contextual factors (at a range of scales) and, crucially, the way these factors are perceived and responded to by health professionals in Chapter 5. The central contribution of the thesis therefore is to provide an enhanced understanding of the ways in which asthma is understood and managed by health practitioners in the local contexts they work in.

The purpose of this introductory chapter is to describe the importance and rationale of undertaking asthma as a disease to be researched in this thesis outlining the problem setting, the key themes and concepts that build into the Scottish context, the methodological approaches and where the focus of this research will be situated. Then, the aim and research questions are detailed and the chapter concludes with a brief description of each one of the six chapters that constitute this thesis.

1.1 Problem Context

Respiratory diseases are recognized as one of the five major non-communicable diseases (NCDs) that cause mortality and disability (the others being cardiovascular disease, stroke, cancer and diabetes) (Murray et al. 2012). The importance of NCDs for improving global health has only been recognised in the last decade and the focus primarily has been to decrease mortality rates (Beaglehole et al. 2011). Within the realm of non-communicable diseases, asthma is a "neglected epidemic" (Pearce et al. 2013). Although asthma is included under chronic respiratory diseases, it rarely causes

death, thus being overlooked compared to other diseases that cause mortality; for implementing interventions and strategies that would decrease the burden of health (Pearce et al. 2013). Another plausible reason for asthma to be considered as neglected is because it is commonly understood to be related to smoking, and therefore is a condition that individuals could manage better themselves (Eisner et al. 2001; Precht et al. 2003; Perret et al. 2013).

The impact of asthma is lifelong and enormous afflicting individuals, families, and society in low, middle and high income countries (WHO 2007).Worldwide, 235 million people are currently affected by asthma and the prevalence is rising (ISAAC 2011). The Global Burden of Disease report ranks asthma as 14th in terms of global years lived with disability (Vos et al. 2012).

Asthma is the most common respiratory disease present in the UK and 5.4 million people are currently receiving treatment for it in which 1.1 million are children (1 in 11) and 4.3 million are adults (1 in 12). In Scotland alone, 368,000 people suffer from asthma out of which 296,000 are adults and 72,000 are children (Asthma UK 2011). An estimated 75% of hospital admissions for asthma are avoidable and as many as 90% of the deaths from asthma are preventable (Asthma UK 2011), because people are understood to be responsible for its management through proper medications and avoidance of triggers that may exacerbate their condition.

Thus, it can be understood that asthma still seemed hard to prevent as deprivation is often cited as a key factor which drives people to smoking behaviours and not take control of their own health (Watson et al. 1996; Salmond et al. 1999; Austin et al. 2005). So it is accepted that socio-economic conditions are related to asthma but this has not

really fed through into policy. There is something clearly wrong with the current clinical management of asthma and this thesis explores what could be the reasons for this, focusing on the local General Practice context where asthma is mostly treated.

Asthma is a significant cause of impaired quality of life and hospital admissions in Scotland (SCOT PHO 2012). Based on cases identified in primary care General Practice registers, the QOF-reported national prevalence rate for asthma has risen from 5.4% in 2004/05 to 6.3% in 2014/15 (ISD SCOTLAND 2012) which may also be due to improved case ascertainment by practices over time.

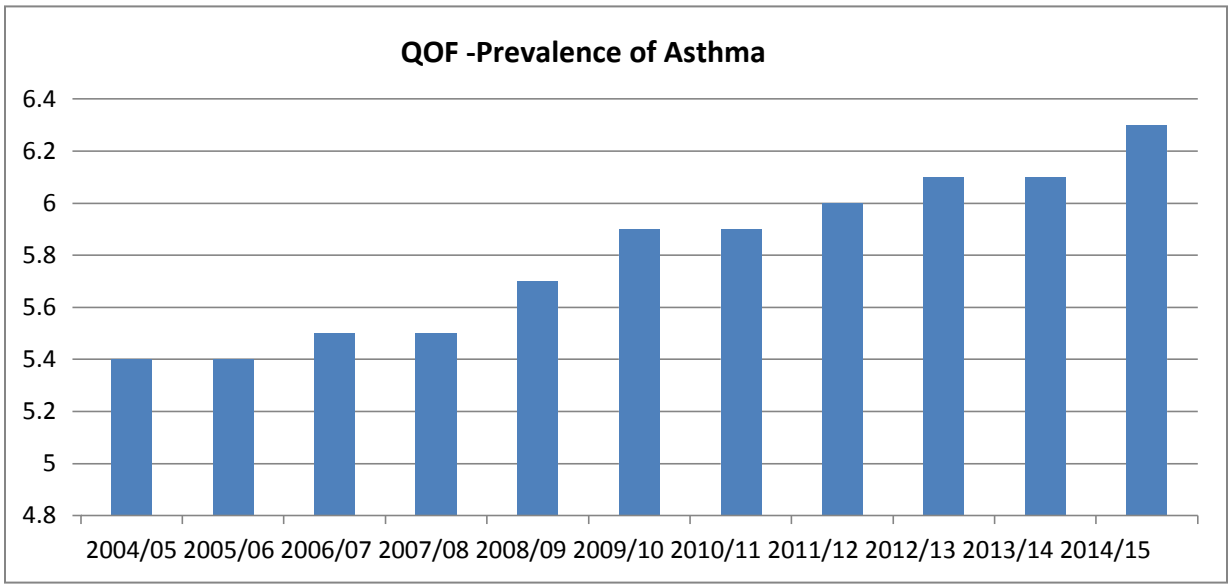


Fig 1.1 Crude Prevalence calculated from GP practices from the QOF Data -Source ISD Scotland

Out of the total 368,000 people suffering from asthma in Scotland, 278,000 people consulted a General Practitioner or Practice Nurse for asthma at least once during 2012/13 (SCOT PHO 2012) making GPs and Nurses an important set of people in General Practices to research.

The fundamental causes of asthma are not completely understood. The strongest risk factors for developing asthma are a combination of genetic predisposition with environmental exposure to inhaled substances and particles that may provoke allergic reactions or irritate the airways, such as:

- Indoor allergens (for example house dust mites in bedding, carpets and stuffed furniture, pollution and pet dander)
- Outdoor allergens (such as pollens and moulds)
- Tobacco smoke
- Chemical irritants in the workplace
- Air pollution

Other triggers can include cold air, extreme emotional arousal such as anger or fear, and physical exercise. Even certain medications can trigger asthma: aspirin and other non-steroid anti-inflammatory drugs, and beta-blockers (which are used to treat high blood pressure, heart conditions and migraine); (WHO 2011). Studies have also looked into the social environment where factors like deprivation (Burr et al. 1997) and poverty (Rona 2000) drive people into developing smoking behaviours and violence (Apter 2010) which have been linked to asthma. The combination of these factors from the physical and social environment builds into the context to which an individual with asthma is exposed to. Understanding, particularly the way that health professional responded to asthma acknowledging the socio-environmental contexts and how they incorporated this into their practice of asthma management formed part of the rationale to undertake this research which is described in detail next.

(A detailed review of the precipitating factors is undertaken in Chapter 2 to examine the impact and causative pathways that can influence an individual with asthma).

1.2 Rationale for Research

Scotland has a high prevalence of asthma (SCOT PHO 2012; Masoli et al. 2004) and the rate has been on the rise. Deprivation and health inequalities are a major problem in Scotland (The Scottish Government 2012) and urbanisation combined with pollution can have a link with asthma (Robinson et al. 2011; Vieira et al. 2012) due to the multi-factorial nature of the disease. Thus, examining the role of place which incorporates these socio-environmental contexts in relation to asthma is needed to understand and interpret if there were geographical variations in asthma outcomes e.g. an area with high asthma prevalence and deprivation rates compared against an area with low asthma prevalence and deprivation rate. Measures of deprivation incorporate a range of socio-economic factors e.g. the Scottish Index of Multiple Deprivation SIMD (income, employment, education, health, geographical access, crime and housing) or the Townsend Index (unemployment, home ownership, overcrowding, and ownership of car). Chapter 4 explores deprivation rates measured at the patient and practice level comparing it with the crude prevalence rates of asthma at General Practices to understand the association of deprivation and asthma in the Scottish context.

Health personnel (General Practitioners, Nurses) are the main integral link between patients and treatment outcomes. They are important in addition to other stakeholders (Public Health officials, asthma support groups, and Health Board officials etc.) who are indirectly involved in the overall management of the disease. It is important to understand the chains of causation, exploring how local and individual and structural/system properties influence asthma care and management from their perspective as the health practitioners are also located in the places where their

patients are.

Thus the rationale for undertaking this research was because even though studies have suggested a relationship between asthma prevalence and deprivation there is a need to consider this in greater detail especially in the Scottish context, using different measures of deprivation (which incorporate combinations of socio-economic and environmental factors) collected at the patient and practice level.

Asthma is shaped by a series of interconnecting factors at the local scale, and locally based healthcare professionals (at General Practices) are the ones who provide the majority of treatment, yet very little is known about how they understand and respond to these challenges. This research will explore how health professionals understand the role of individual and contextual factors in shaping asthma prevalence and interpret how this shapes their management of asthma at Scottish General Practices.

The next section gives an insight into the socio-environmental context of asthma that this research will look into reflecting on the role of deprivation, place effects on health and the management of asthma that builds into this context.

1.3 Deprivation and Health: The Scottish Context

The focus of asthma and social factors has been primarily on the role of deprivation and the strong relationship between health status and deprivation has been demonstrated in a large number of literature (McLoone & Boddy 1994; Carstairs & Morris 1989; Smith et al. 1990); in particular, studies in the past decades have shown evidence of relationships between asthma prevalence, treatment, severity and deprivation (Mitchell & Dawson 1973; Mielck et al. 1996; Burr et al. 1997). It is important to note that

deprivation is a complex concept with different measures, each of which includes a different mix of elements tabulated as seen in the SIMD and Townsend Index (The Scottish Government 2012; Townsend 1987).

People living in rural areas, live an average two to three years longer than people in urban areas and can expect to live in good health for an average of six years longer. This may be partly due to rural areas generally having lower levels of deprivation (Audit Scotland 2012) or air pollution (Mitchell & Dorling 2003). But rural areas also have deprived hotspots with problems like access to health care services (Haynes 1991) or unemployment (Lindsay et al. 2003) that can be seen as deprivation factors.

The insight that where one lives makes a difference to one's health is not new. The physical features present in an environment can be salutogenic or pathogenic to health. However, populations are not exposed to single environmental factors in isolation. They simultaneously experience multiple exposures (Richardson et al. 2009). Evans & Kantrowitz (2002) suggest that "multiple exposures to a plethora of suboptimal environmental conditions" may help explain a significant part of socio-economic inequalities in health.

Scotland is often termed as 'The sick man of Europe' because of lower life expectancy and high mortality rates, especially among adults of working age (Leon et al. 2003). Also, there is evidence of a 'Scottish effect' and a 'Glasgow effect' (Reid 2009) which identifies that higher levels of mortality and ill health are found in Scotland and on the West coast of Scotland, namely Glasgow, compared to other places in the United Kingdom which cannot be explained by socio-economic circumstances alone (Scottish Government, 2010) and there are other factors entwined like health inequalities.

Health inequalities is a serious problem in Scotland (Audit Scotland 2012) and studies have shown the links between health inequalities and asthma (Mackenbach & Bakker 2003 ; Propper & Rigg 2006). The Scottish Government describes health inequalities as the disparities between those in higher socio-economic groups and those in lower socio-economic groups as well as disparities across rural and urban areas. It states that "poor mental and physical health is both a cause and a consequence of social, economic and environmental inequalities and intergenerational factors risk perpetuating health inequalities from parent to child" (The Scottish Government 2007). Health inequalities are linked to a range of factors that are complex and interrelated. For example, genetic factors and poor housing can have a major effect on an individual's health over time, and these are likely to be exacerbated by harmful behaviours such as smoking (D'Amato et al. 2005) or access to healthcare services (Mercer & Watt 2007).

Thus it can be seen that it is not just deprivation alone but a range of factors that that forms a part of the context which shape ill health which will be interesting to explore for a multi factorial disease like asthma, and the role of place comes into importance which is discussed next.

1.4 Understanding the Role of "Place"

Place matters for health as it has been established that health outcomes tend to be worse in the most socio-economically deprived groups with health improving relative to affluence (Ellaway et al. 2001; Macintyre et al. 2002). Understanding the characteristics of place and how it can influence and shape health especially for a multifactorial disease like asthma was essential in the Scottish context where deprivation and health

inequalities were present. There is frequently a lack of clarity around how places influence individual behaviour and the wider context where one lives is not often considered in general health research but widely acknowledged in Geography. A general critique of quantitative studies of place/ neighbourhood effects on health is that correlations are often made between area characteristics and disease rather than providing causal explanations.

Understanding the causes of ill health based only on individual behaviour or characteristics are inadequate and do not fully explain the determinants of disease. Macintyre et al. (2002) hypothesised that it was important to consider not only individual characteristics (composition), but also the characteristics of the groups or contexts which individuals belong to in order to understand the distribution of disease (contexts). Therefore, neighbourhoods have become important contexts to study because they possess various and varying physical and social attributes (compositional and contextual aspects) which could affect the health of individual residents (Diez Roux & Mair 2010; Kawachi & Subramanian 2007).

The compositional explanation for the geographical patterning of health outcomes are due to the characteristics of the individual residents living in these areas. Likewise, the contextual explanation for the spatial differences in health is on account of the exposure to the features and characteristics of the area in which the individual lives (Macintyre et al. 2002). The authors further explained the existence of the collective dimension to geographical variations in health where the importance of shared norms, traditions, values, and interests exist, adding an anthropological perspective to the socioeconomic, psychological, and epidemiological perspectives often used to examine

area effects on health.

Cummins et al. (2007) later proposed that charting an individual's personal geography through multiple places and contexts over a varied period of time can help in interpreting extent of exposure, which environments are most salient for health in terms of location, duration and how personal characteristics of individuals mediate this relationship. Understanding the importance of local place factors in relation to the management of a disease like asthma would be important, adding to the context in which asthma presents itself. The next section gives an insight into the management aspects of asthma.

1.5 Asthma Care and Management: The Present Picture

Asthma care in Scotland is primarily carried out by General Practices affiliated to the various Health boards of the NHS in Scotland. The support services are coordinated with Asthma UK and local health workers from the local councils. If a patient with asthma has a very severe attack and is unable to breathe properly, the emergency services at the nearest hospital is utilised for treatment, admission and relief of symptoms. The patients are then referred back to the General Practice they are registered in for follow up treatment (Neville et al. 1996).

As a part of the wider long term management of asthma, patients are advised self-management plans or asthma action plans that empower them with a self-responsibility and individualisation in managing their condition (Ciaccio & Portnoy 2009). These are standards set out to help a person with asthma actively manage their own health and well-being so that they know their condition and various treatment

options, agree a plan of care with their healthcare professional, engage in activities that protect and promote their health, monitor and manage the symptoms and signs of their condition and know, how and when to seek appropriate medical care (Gibson et al. 2003).

Self-management has the potential to improve health outcomes in some cases, with patients reporting increase in physical functioning, patient experience and adherence to treatment and medication (Challis 2010). Self-management programmes have been shown to reduce unplanned hospital admissions for chronic obstructive pulmonary disease (COPD) and asthma (Purdy 2010). The overall aim is for people to be informed, active participants in their healthcare to maintain health, and prevent or slow the progression of their disease (Public Health Agency 2012).

Optimal self-management should be the goal for nearly all people with asthma to lead a normal, healthy and active life. This relies on a productive partnership approach between the healthcare professional and the patient in order to be truly successful. Yet, the Outcomes Strategy for COPD and asthma under the NHS noted that asthma is a condition which is very poorly controlled (NHS National Improvement Projects 2012). Self-management, and asthma management more broadly, does often not work in practice, for a range of reasons, including the local social contexts, and healthcare (GP practice) contexts. One of the aims and contributions of the thesis is to understand in depth why asthma management often doesn't work, and why self-management often fails.

(A review on the management practices adopted in the treatment of asthma is described in detail in Chapter 2 to understand the initiatives and approaches in the management of the disease).

1.6 Summarising the Context

Thus, asthma can be seen as a disease that is neglected because attention has been driven towards other chronic conditions like CHD, COPD, cancer etc. that cause mortality, despite its high prevalence among the Scottish population. Scotland has some of the same social, economic and environmental contexts present in developed countries where asthma is a major burden especially with a high urban population (Kobza 2015). Different exposures may have additive, synergistic or antagonistic effects on health when experienced in combination (Sterner 2010).

This research reflects and contributes to the examination of asthma, comparing it with deprivation in the Scottish context (Chapter 4) and moving beyond deprivation to a range of other factors; and crucially how key health professionals interpreted and responded to these contextual factors, understood the balance of individual and contextual causes of asthma, and how they responded to them (explored in Chapter 5); as such, it revealed some of the complexities existing in prevalence and management of asthma in the Scottish context.

An added interest to pursue this research was that in my experience as a medical doctor in India, I had seen lots of patients with asthma and my focus was in providing adequate clinical treatment to lessen the severity and stabilising the condition in the patient. I had not paid much attention to the contextual factors the patient was exposed to because as I did not feel it was in my responsibility or part of my job. This research would help me to understand asthma better from a very different perspective as GPs and Practice Nurses who are directly involved in management are locally based

and the health care that is provided are also part of the place contexts.

The next section will describe the aim, the methodological approaches and research questions that guided this research study.

1.7 Aim, Methodological Approaches and Research Questions

The main aim of this research is to identify, understand and interpret the nature and role of the socio-environmental context in relation to asthma prevalence and management at the Scottish primary care setting.

Adopting an interdisciplinary approach utilising concepts and methods from Geography and Public Health provided better insights into the factors that could influence the prevalence and management of asthma in an area compared to previous single discipline studies.

The focus of this research was not to look at clinical outcomes from a clinical perspective but instead to examine the socio-environmental dimensions from a Geographical and Public Health perspective. Crucially, looking at two aspects – first, the deprivation-asthma relationship (which is the dominant factor linked with asthma from the general literature) at the Scottish primary care level, and then second using this as a platform to broaden out the discussion to a range of factors in local places; importantly, this focused on the perceptions of health practitioners of causes of asthma, and how this shaped their practice.

Thus, this unique and innovative interdisciplinary approach - looking at the role of place and health incorporating the contextual factors that shape asthma prevalence (Geography) and how it could shape the management of asthma at the Scottish

Primary care level (Public Health) – is a new way to understand how asthma presents itself.

The high prevalence of asthma in Scotland (SCOT PHO 2012; Masoli et al. 2004) suggests that asthma management may have not improved and the burden has only got worse. It was important to have a better understanding of the prevalence of asthma and its relationship to deprivation in Scotland in addition to other socio-environmental factors that shape the management of asthma at General Practices [e.g. physical environmental triggers like air pollution as current evidence suggests that air pollution levels are increasing and health is being damaged (BBC 2016)]. This helps in communicating to decision makers a coherent and convincing story about how different contexts of place, people and disease affect hopes, aspirations, opportunities and misery, as well as levels of wellbeing in an area. This research is timely as it takes stock of both what we know and what we need to know in order to advance to the next stage of evidence and policy.

The research first incorporated a literature review to critically examine the linkages between the socio-environmental context and asthma. The findings from the review drove the need to undertake a quantitative analysis of a robust asthma dataset that explored the associations between different rates of deprivation (measured at the patient and practice level) and asthma prevalence as deprivation dominated the literature in the overall context of asthma. The results of the analysis guided the research for a qualitative case study incorporating in depth semi structured interviews, exploring the perceptions of the stakeholders involved in asthma care on the socio - environmental contexts that shaped asthma management at Scottish General Practices.

A case study approach was undertaken as it sets out to capture contemporary phenomenon within a real world setting when the boundaries between phenomenon and context are not really evident (Yin 2003). Two General Practices in Scotland was selected as the case study sites and a General Practice with a high crude prevalence of asthma and located in an area of high deprivation was compared against a General Practice that had a lower crude prevalence of asthma and located in an area of middle/ lower deprivation level.

The importance of this approach was that it was possible to understand perspectives from the stakeholders who are directly involved with the management of asthma at the General Practices e.g. the General Practitioners, Nurses, Community Health workers; they determine to a large extent how clinical management and support is carried out with the patients. The Health Board officials (Respiratory Consultant, Environmental Public Health Specialist and Public Health Manager) and Asthma Support Groups are mainly engaged in promoting and overlooking chronic disease management programs that are pertinent to the primary care level and their perspectives mainly reflect the dominant policy prevailing in the management of the disease. The views from the Local Council officials (Environmental Manager and Housing Officer) helped in providing a physical environmental perspective linked to asthma for the evidence gathered to this case study.

The research did not involve patients' perspectives as the focus of this case study was to understand the way in which asthma was addressed and managed within these environmental contexts at the General Practice scale by the stakeholders. Their perspectives are very significant as they are the main sources involved directly or

indirectly in the care and management of the disease and exploring patient perspectives would be the next stage of this research in future.

The research question that guided the literature review that was undertaken at the first stage of the research was:

Research Question 1: What is the current evidence of the relationship between the socio-environmental factors and asthma outcomes?

By undertaking a critical interpretation of the literature on socio-environmental contexts and asthma outcomes, the results from the review guided a quantitative analysis of a secondary dataset on asthma pertinent to the Scottish context and the research question that directed this second phase was:

Research Question 2: What is the relationship between the crude prevalence rates of asthma and deprivation measured at the practice and patient level at General Practices in Scotland?

The results from the analysis led to move beyond deprivation and broaden the examination of asthma prevalence from a focus on deprivation to an appreciation of numerous contextual factors (at a range of scales) and, expanding to involve the wider socio-environmental contexts and how it was implicated for the successful management of asthma as a long term condition. This led to the final stage of this research to undertake a qualitative case study and the research question that guided this phase was:

Research Question 3: What perceptions do stakeholders involved in asthma care have on the nature and extent of socio-environmental factors that shape the

prevalence and management of asthma at General Practices in Scotland?

The perceptions of the different stakeholders were compared, analysed and interpreted and the main themes emerged out from the case study concluding the final stage of the research. The next section describes the structure of this PhD.

1.8 Structure of the PhD

To conclude this introductory chapter, the thesis structure is outlined. Following this introductory chapter, the literature pertinent to the thesis is reviewed in **Chapter Two.** The literature review was undertaken to explore the connections/linkages between the socio-environmental context and health with a particular emphasis on asthma and the healthcare responses to asthma management. Starting at a broader scale, the review looked into the role played by "health and place" contexts in shaping health in general and narrowed down specifically to understand how the different factors that formed a part of this context had the potential to shape the prevalence and management of asthma. The review helped to identify the most common socio-environmental factors studied upon i.e. deprivation, highlight the importance of asthma-place relationships in the context of this research responding to Research Question 1 in this thesis.The contribution of this chapter to the overall thesis was to show the importance of integrating place contexts in relation to asthma research gave insights into the relationship that exists between asthma, place and contextual factors (which comprised from the socio-environmental triggers to disease management approaches) and these factors built into the context for a complex disease like asthma.

Adopting an interdisciplinary approach which permits utilising multiple methods for data collection was advantageous to study a multi factorial disease like asthma. The

multi method approach of this thesis, in relation to the main research questions is outlined and evaluated in **Chapter Three**. The methodological approaches adopted provided a framework for data exploration, integration, analysis and interpretation in this thesis. This chapter begins at the theory level with a detailed description of the ontological and epistemological perspectives that provided the rationale for the methods adopted. This is followed by a description of the methodological context that directed the research explaining the importance of integrating an interdisciplinary approach at the intersection of social sciences (e.g. Geography) and applied health sciences (e.g. Public health) and adopting multiple methods to gather and analyse the data for this thesis. The two types of data used in the thesis, both quantitative (analysis of a secondary dataset on asthma) and qualitative (semi–structured interviews from the Case study sites) are also described and a detailed description of the methods employed and how it would be interpreted in this thesis concludes the chapter. The contribution of this Chapter to the overall thesis is to recognise the importance of a multi-disciplinary approach to the study of asthma (to capture the multiple factors that shape asthma prevalence and management).

The quantitative analysis in **Chapter Four** was undertaken to understand the asthma–place contexts relationship in relation to deprivation by critically exploring the conventional approaches to examine asthma prevalence and management against deprivation indices from the literature and explore what they tell us about this relationship.

To help illustrate and elaborate on this aspect, this chapter includes an empirical analysis which corresponded to Research Question 2 of this thesis, comparing the

relationship of asthma prevalence with a deprivation index pertinent to the Scottish context (SIMD) utilising a secondary data set of a UK wide asthma audit. The overall contribution of this chapter is the understanding of what a conventional deprivation measure does/ does not reveal about asthma–place contexts and helped to advance the research into the next stage to explore the way that health professionals (and related stakeholders) understand and respond to these factors that shape the causation and prevalence of asthma (including socio-environmental contexts); and how this in turn shapes their management of the condition in their practice.

Chapter Five presents the results from the case study that concluded the final stage of this research. Corresponding to Research Question 3 in this thesis, in-depth semi-structured interviews were undertaken with stakeholders involved in asthma care and management to examine their perceptions of the socio-environmental factors shaping asthma prevalence and management at Scottish General Practices. The distinct contribution of this chapter to the thesis was that it gave insights on how health professionals perceived their area, patient population and how they integrated this perceptions it into their practice as their understanding or lack of understanding or their inability to act upon their understanding on the importance of the socio-environmental context shapes their management of asthma.

In the concluding **Chapter Six**, the main findings from the thesis are summarised. Additionally, a Public health model was constructed and explained based on the results from **Chapter Four** and **Five** and the contributions and limitations of the thesis, policy implications and recommendations are summarised.

Thus, asthma provides an excellent example for understanding the role of community

level contextual factors in a disease especially from a multidisciplinary approach that examined the broader socio-environmental contexts in which individuals live; and to identify pathways that may link neighbourhood contextual influences to asthma morbidity. Integrating an approach that identifies inequalities, exposures and inadequacies that may influence asthma prevalence and management was essential in this research. The next Chapter begins this exploration by reviewing the existing literature to understand the importance of place contexts on health and narrows down to explore the connections/linkages between the socio-environmental context and health with a particular emphasis on asthma and the healthcare responses to asthma.

Chapter Two

Literature Review

2.1 Introduction

The literature review was undertaken to explore the connections/linkages between the socio-environmental context and health with a particular emphasis on asthma and the healthcare responses to asthma management answering Research Question 1 of this thesis to understand from the current evidence of the relationship between the socio-environmental factors and asthma outcomes?

Starting at a broader scale, the review first looked into the role played by "health and place" contexts in shaping health in general revealing the relationships that exist between Geography and Public Health (Stage 1) and narrowed down specifically to explore and understand how the different factors that formed a part of this context had the potential to shape the prevalence and management of asthma (Stage 2). The review helped to identify the most common socio-environmental factor studied upon i.e. deprivation, highlight the importance of asthma-place relationships in the context of this research responding to Research Question 1 in this thesis. The contribution of this chapter to the overall thesis was to show the importance of integrating place contexts in relation to asthma research gave insights into the relationship that exists between asthma, place and contextual factors (which comprised from the socio-environmental triggers to disease management approaches) and these factors built into the context for a complex disease like asthma.

The chapter first describes the background to undertake the literature review. The next part then describes the review methodology adopted and justification to utilise this approach. The aims of the review are then described along with the review questions, search strategy utilised, definition of the key search terms, inclusion and exclusion criteria, search, screening and selection process. Finally the results are described in detail along with the discussion and conclusions from this review.

2.2 Background to the literature review

The literature review focuses on the connections between the environment and health in general and between environment and asthma specifically. It was necessary to understand the different contexts in which the prevalence and management of asthma were studied. Most importantly, this review explored and identified how socio geographical elements like place factors (which constitute an environment) might be health damaging or health promoting to an individual with asthma.

In order to capture these different contexts that could influence asthma, the literature review search was not limited by academic discipline but reflected the interdisciplinary nature of this field of research across multiple disciplines that included Geography, Public Health and Medicine.

2.3 Review Method

A review method that would integrate studies from different disciplines was necessary to adopt and an integrative review method was utilised for this literature review. Integrative reviews are the broadest type of research review methods allowing for the simultaneous inclusion of experimental and non-experimental research in order to

more fully understand a phenomenon of concern (Whittemore & Knafl 2005). Integrative reviews may also combine data from the theoretical as well as empirical literature. In addition, integrative reviews incorporate a wide range of purposes: to define concepts, to review theories, to review evidence, and to analyse methodological issues of a particular topic (Broome 1993). The varied sampling frame of integrative reviews in conjunction with the multiplicity of purposes has the potential to result in a comprehensive portrayal of complex concepts, theories, or health care problems of importance which would be advantageous for understanding a multifactorial disease like asthma.

Since the integrative review method can incorporate diverse methodologies in order to capture the context, processes and subjective elements of the phenomenon being studied, combining diverse data groups can be complex and challenging (Whittemore & Knafl 2005). The reviewer can make it simpler by noting intervening factors and building a logical chain of evidence (Miles & Huberman 1994; Sandelowski 1995; Patton 2002).

All the reviews are presented as narrative overviews as they are comprehensive narrative syntheses of previously published information and discuss the state of science of a specific topic or theme from a theoretical and contextual point of view (Green et al. 2006; Hammersley 2001). Narrative overviews are useful educational articles since they pull many pieces of information together into a readable format and are helpful in presenting a broad perspective on a topic and often describe the history or development of a problem or its management (Day 2009; Slavin 1995) and a formal assessment of methodological quality of the included studies in a narrative review is

generally not performed (The Joanna Briggs Institute, 2015). Since asthma covers a wider array of environmental, social and management perspectives, it was decided to utilise a narrative overview to describe the contexts in which asthma situates itself.

The literature review was divided into two stages as it helped to describe the contextual factors that shape health in general from the broader environment in Stage 1; Stage 2 described the specific factors that form part of this broader environment that shapes asthma prevalence and management. To filter out only relevant studies that looked at the environmental, social and management factors relevant to asthma only, the Boolean term "AND" was used in combination for this search. E.g asthma AND environmental factors.

A conceptual diagram (Fig 2.1) on the next page explains how the literature review process was undertaken.

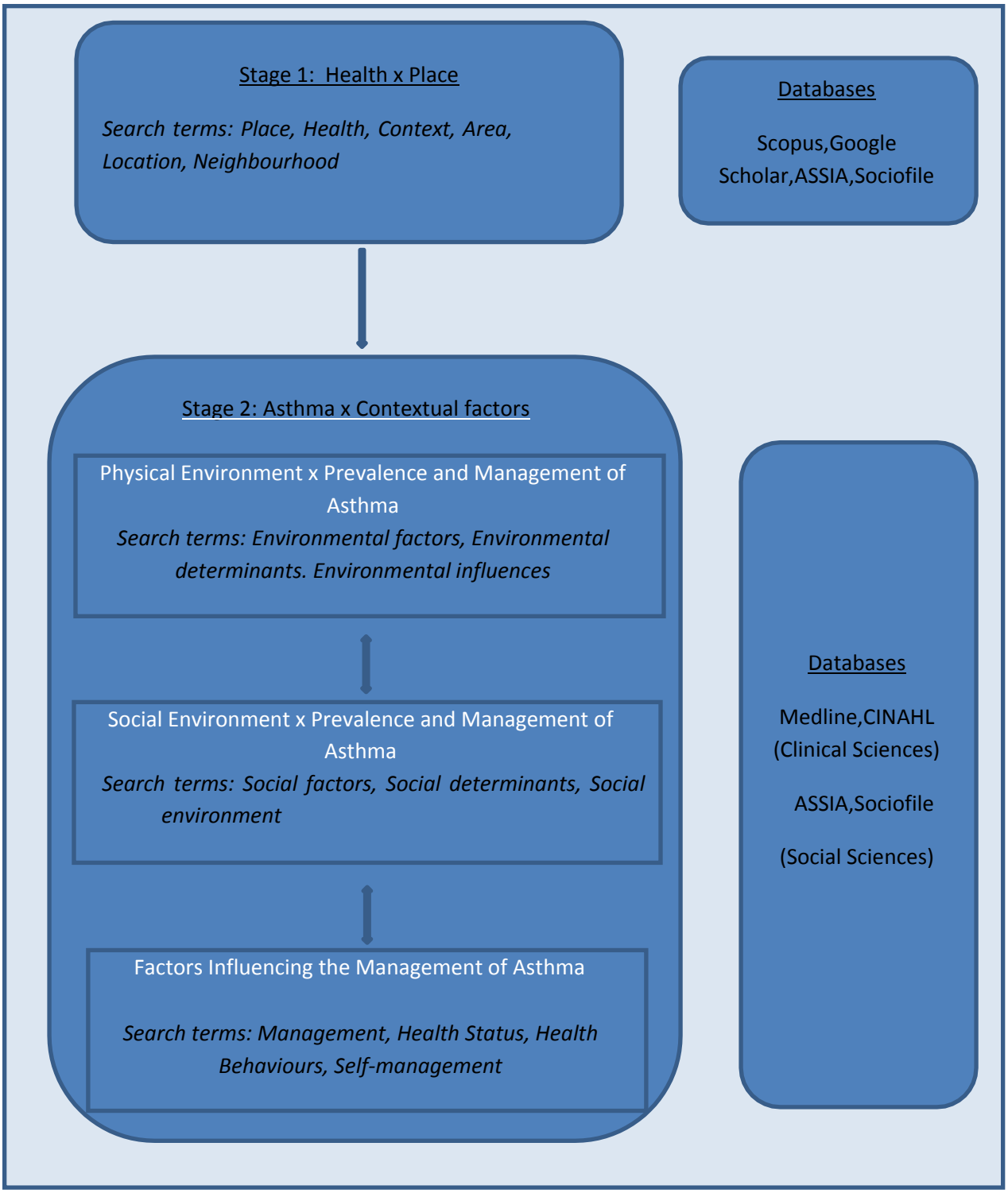


Fig 2.1 Literature Review Process and Databases Utilised

This first stage of the review helped to understand "health and place" in the broader context describing what we know about health and place interactions. The results

from this stage aided the second stage of the review which explored the contextual factors shaping "asthma" specifically as a subset of the different environmental contexts of "health and place"; and how it related to asthma prevalence and management of the disease. The results from both the reviews were then integrated and synthesised to complete the literature review.

2.3.1 Definition of key terms

It was necessary to clarify a few search terms that were used in this review.
The "Environment" and "Context" are two key words that would be resonating throughout this thesis.

The "Environment" is defined as the surroundings or conditions in which a person, animal, or plant lives or operates. It also refers to the natural world, as a whole or in a particular geographical area, especially as affected by human activity (Oxford Dictionary). Though it is possible to understand the distinction between the bigger environment that encompasses the natural world, the focus of this research is limited to a smaller geographical scale where national and local environmental scales are looked into; but which incorporates all the features of the natural world. It was therefore decided at the beginning of the review process to use a broader interpretation of the "Environment" which incorporates the different scales from the narrower micro environment present at the home to larger local neighbourhood and national level environments that form part of the natural world and other non-natural aspects of the 'environment', e.g. built environment, transport environment, social environment, and economic environment. The environment incorporates a variety of factors which are related and seen in conjunction, e.g. socio-economic and socio- environmental factors

and these factors would also be described to be a part of the environment.

Similarly "Context" is defined as the circumstances that form the setting for an event, statement, or idea, and in terms of which it can be fully understood (Oxford Dictionary). In this thesis, the context incorporates contextual factors like physical or social environmental characteristics; these are a part of the broader setting where events related to asthma can be identified.

The use of "Place "in this review would pertain only to a particular area in larger surface or a location even though it has a variety of meanings (position, rank, right, privilege etc.). (Place and its meaning is explained in detail later in Section 2.4.1)

2.3.2 Aims and Review Questions

The aim of the first stage of this review was to explore and describe from the current literature the role played by "Health and Place" contexts in shaping health.

The review question that guided this stage was:

1) What role do "Health and Place" contexts play in shaping health?

The findings from the first stage helped the review to progress into the next level of enquiry which specifically looked at the relationship between "Health and Place contexts" and asthma.

The aim for the second stage of the review was to identify the different factors in relation to asthma that formed a part of the "Health and Place" context and describe the mechanisms by which they had the potential to shape asthma prevalence and management. Since this stage of the review also sought to understand the different

contexts within which asthma presents itself, it was necessary that the review questions incorporated multiple areas of query. The main questions that guided this this review at this stage were:

a) What are the main socio-environmental and management factors present in the environment of an area that could influence asthma?

b) How do these operate in shaping the nature and management of the disease?

2.3.3 Search strategy

Electronic databases including Medline, CINAHL (Clinical sciences) and ASSIA and Sociofile (Social sciences) were utilised to search the literature for this review. Cited reference searches, and published articles were systematically searched for relevant studies. A combination of subject headings and key words were used to identify the pertinent literature. Reference lists of studies included in the review were screened to identify other possible studies for inclusion in the review. There were no filters applied to the time frame when these studies were published and all studies were included that matched the inclusion criteria.

2.3.4 Inclusion and Exclusion criteria

The inclusion criteria to select papers for the stage 1 of the review revolved around those which discussed health or disease in general in relation to place contexts that also discussed area, neighbourhood and location. Papers that were not published in English were excluded from the review. More detailed inclusion and exclusion criteria were utilised for looking at asthma and the different socio-environmental, management factors, as it was necessary to exclude studies which focused on

respiratory conditions other than asthma e.g. COPD, Emphysema, allergic conditions like atopic dermatitis, rhinitis etc. that only looked at drug outcomes and trials. Also, studies which combined asthma with other conditions but did not report asthma results separately, studies which focused on drug trials or on clinical management of the disease, incidence, prevalence studies, economic studies and impact assessments were excluded from the review.

2.3.5 Search, Screening and Selection process

Titles were screened to identify studies that might meet the inclusion criteria. Abstracts were retrieved for all possible papers, read and screened for inclusion and full papers obtained to be included in the review.

The results from the literature review are described on the next page.

2.4 Results of the first stage of the Literature Review

The first stage of the literature review interpreted the role and importance of place in health.

2.4.1 Health and Place

Place is a key concept in human geography (Kearns 1993; Knox & Marston 2013) and even though it signifies a 'geographical locale', it also implies importance in meaning for the people who live there and is also shaped by the people who have lived there in the past. Places are shaped by local and national factors and so are continually changing and transforming (Cresswell 2013). Geographies of health emphasise the centrality of "place" in the study of health (Gesler & Kearns 2005). Place is where people live, and the social, economic and environmental aspects. Place factors have an important role in the production of health and illness, and healthcare (Kearns 1993).

Places have material effects on people e.g. physical environment which comprises the natural environment (air, noise, water, greenspace etc.) and the built environment (houses, roads, transport systems and infrastructure including both the external and internal built environment). Places also include the socio-economic and cultural aspects of everyday life of individuals, societies and communities e.g. cultural norms, health beliefs etc. (Gesler & Kearns 2005). The next subsection provides some evidence on how place aspects became prominent in relation to health.

2.4.1.1 Place effects on health research: Historical transitions in approach

The time period roughly from the end of the Second World War to the early 1990s was deficient in direct studies that looked at the impact of local, social or physical environments on human health especially in the fields of Epidemiology, Medical Geography and Medical Sociology (Macintyre & Ellaway 2000) though there were community studies exploring life in particular localities (Gans 1982; Young & Wilmott 1957). The dominant medical geography tradition at that time drew heavily on epidemiology (Meade 1988), but there has been a shift seen in the new geographies of health with the distancing of the concerns with disease and the interests of the medical world in favour of an increased interest in well-being and broader social models of health and health care which are based on the themes of place, theoretical engagement and critical relevancy (Kearns & Moon 2002).

Macintyre et al. (2002) connects this absence of attention to the influence of local environment on human health to four reasons:

1. Wariness about the use of ecological data, following persuasive critiques of the ecological fallacy. The "ecological fallacy" involves inferring individual level relationships from relationships observed at the aggregate level.

2. Methodological developments in statistics, computing and survey methods vastly improved researchers' ability to hone in, analyse and use data on an individual scale. This provided the opportunity to manipulate large datasets, analyse individual predictors of health and their interactions in complex multivariate analysis.

3. The methodological, conceptual and political individualism that was dominant in many industrialised countries from the 1980s emerged partly from the analyses of the epidemiological transition which emphasised the role in chronic disease of individual life style choices (e.g. the "big four" of smoking, drinking, diet, and exercise) rather than the structural and environmental conditions which had been understood to shape patterns of infectious disease or diseases of extreme want. Further, the dominance of the medical/clinical understanding of health and illness, focused on the individual and their internal medical problems.

4. Trends within modern Geography research delineated along the post-modernist, social constructionist and cultural approaches towards health along with highly technical analyses of linking spatial patterns of disease incidence using geographical information systems (GIS) while research into the actual causes that explored place effects on health was minimal (Macintyre et al. 2002).

The early 1990s witnessed a resurgent interest in exploring the role of place in defining people's health experiences and researchers debated whether it was the place or people that shaped the characteristics and contributed to the social determinants of health.

Post-medical geographies of health have also drawn from innovative thinking in health philosophy to develop new perspectives. An essential aspect of the cultural turn saw health geography shift from biomedical towards social models which placed importance on the consequences of illness and health service provision for both personal well-being and the collective experience of place by communities (Kearns 1993). Health promotion, developed strategically through the Ottawa Charter (WHO

World Health Organisation, 1986) extended that narrow biomedical approach and recognised broader and more critical holistic understandings of health (Williams 2009).

These factors could be one of the driving forces that led researchers to understand and explore "place" and "health" (Macintyre et al. 1993; Sloggett & Joshi 1994; Smith et al. 1998) which helped to reconceptualise the way we think of place and its importance in influencing health especially from an individual and community level perspective (Kearns & Gesler 1998; Curtis 2004). This aspect is detailed in the next subsection.

2.4.1.2 People and Places; Individual vs Population

A growing body of research sought to locate individuals within the places in which they live and explore the relative contribution of individual characteristics and area influences to health inequalities (Macintyre et al. 1993; Sooman et al. 1995; Gatrell et al. 2000; Ellaway et al. 2012; Pearce 2012).

Macintyre et al. in 1993 explored area, class and health and outlined that area level data were commonly used as surrogates for missing individual level data and concluded that focusing on places would help in understanding the local, physical or social environments which might promote or inhibit health.

However, Sloggett & Joshi (1994) studying mortality in deprived areas opined that for maximum effectiveness health policy needs to target people as well as places as deprivation based on area measures were not efficient substitutes to an individual level analysis as there were other direct personal factors that contributed to an individual's deprivation status.

Further studies looking at factors which cause diseases like chronic heart disease, lung cancer and related dietary influences coupled with deprivation at individual and area level (Smith et al. 1998; Diez-Roux et al. 1997; Ecob & Macintyre 2000) led Macintyre et al. (2002) to conclude that apart from one single universal "area effect on health" there were only some area effects on some health outcomes in some population groups and in some type of areas. It becomes clear how local places can shape prevalence of heart disease and a geographical approach can contribute to the study of chronic illnesses (including asthma).

Stafford et al. (2001) found that there is evidence that health is determined by macro-level factors as well as by individual risk factors. Using data from the Whitehall II study, they considered area-level determinants of health and asked two related questions. Firstly, are health differences between areas explained by the individual risk profiles of residents in those areas? Secondly, since poorer people tend to live in poorer places, are individual socio-economic effects on health explained by where people live? It was possible to understand that local place effects are not clear cut and people's health is shaped by factors at a range of levels.

Their findings suggested that areas vary in their health profile and found residential polarisation, with lower status individuals living in more deprived areas. Nevertheless the demographic makeup of areas did not fully explain health differences between areas and the levels of deprivation in the area of residence did not explain health differences between high and low status individuals. The effects on health of area and individual socioeconomic position were independent. Thus it may be possible that people living in the same area are subjected to roughly the same kind of exposures but

may have different outcomes due to their circumstances. The next section describes and provides some insights into why these variations may occur.

2.4.1.3 Geographical Variations in Health: Compositional, Contextual and Collective Exposures

To understand the geographical variations from place effects on health, Macintyre et al. (2002) explained that the "compositional" explanation for the geographical patterning of health outcomes is due to the characteristics of the individual residents living in these areas e.g. literacy drug abuse, unemployment etc. Compositional effects are seen to be due to the varying distribution of types of people whose individual characteristics influence their health i.e. similar types of people will have similar health experience no matter where they live.

The "contextual" explanation for the spatial differences in health are an account of the exposure to the features and characteristics of the area in which the individual lives, e.g. living in a poor or affluent area, exposure to factors detrimental or salutogenic to health viz. close proximity to a pollution source or green spaces. Contextual effects operate where the overall health experience of an individual depends not only on his or her own characteristics but also on the area where the individual lives. It may be seen that that similar types of people have different health status from one place or another.

Later, Cummins et al. (2007) further explained the existence of the collective dimension to geographical variations in health where the importance of shared norms, traditions, values, and interests exist adding an anthropological perspective to the

socioeconomic, psychological, and epidemiological perspectives often used to examine area effects on health.

Cummins et al. (2007) also observed that the dualism of context and composition independently was not feasible and there was a need to reinforce a mutual and reciprocal relationship between people and place. This leads to analysing the processes and interactions that can occur between people, social and physical resources in the environment. They also postulated that the 'context' and 'place' varies in time and charting an individual's personal geography through multiple places and contexts over a varied period of time could give improved measures of exposure and help us to understand which environments are most salient for health in terms of location and duration and how personal characteristics of individuals mediate this relationship.

Understanding how Health Geography and applied Public Health interact is important as Geography has contributed to the 'social model' of health where the shift is from individualised to collective, social understandings of health (Dunn & Cummins 2007). They emphasise the complex ways in which social and environmental conditions in an area impact on health outcomes, helping improve understandings of the contextual processes relating to health and implications for public and primary health approaches. One way to understand this is the examples of developing chronic illness like heart disease, COPD and lung cancer due to a variety of factors that include bad dietary influences, smoking and place factors (like living in a deprived area) where the resources are slim for the overall wellbeing of the individual. This shows the advantages of the insights that can be gained from utlising Geography and Public Health approaches. The focus on place effects on a condition that has not received

much attention like asthma would be important and targeting approaches to manage asthma which are more localised to the area than national contexts would help to mitigate and resolve more closely related issues particular to places, people and disease.

These studies emphasise the importance of place and point out that for better health outcomes to emerge and to enhance understanding it is necessary to incorporate the contextual, compositional constituents of an area and individual influences for a multifactorial disease like asthma where ecological and environmental exposures have predominant influence and area, neighbourhood characteristics may also determine disease severity and morbidity which is discussed next.

2.4.1.4 Neighbourhood Contexts and Health

Neighbourhoods have emerged as potentially relevant contexts to study in relation to health because they possess both physical and social attributes which could plausibly affect the health of individuals (Diez Roux et al. 2010). The authors state that the interest in neighbourhoods and health has been driven by several interrelated trends within public health and epidemiology. Most notable among these trends is the growing sense that depending purely on individual based explanations for the causes of ill health were insufficient as they failed to capture important disease determinants working in tandem (pathogens, host behaviours and susceptibility; and non-living agents like heat, cold, toxic substances, poverty etc.), and there was a need to consider not only individual characteristics but also characteristics of the groups or contexts to which individuals belong in understanding the distribution of health and disease (Schwartz et al. 1999; Diez Roux 1998). It is here where neighbourhoods emerge as an

important context to consider as they possess both physical and social attributes which could affect the health of individuals.

Another trend noted by the authors was the revitalised interest in understanding the causes of social inequalities, race/ethnic differences in health which make neighbourhood health contexts important to focus research on. Neighbourhood characteristics could be important contributors to inequalities in health as area of residence is strongly patterned with social position (Diez Roux & Mair 2010).Thus, understanding the distribution of health and disease acknowledging the"Context" (the exposure to the features and characteristics of the area in which the individual lives) and "Composition" (the characteristics of the individual residents living in these areas) of neighbourhoods will be integral.

Diez Roux et al. (2010) also note that the policies on housing or urban planning could affect health through their impact on the contexts in which individuals live e.g. the lack of adequate quality housing can lead to housing stress which can affect health, accessible work opportunities can relieve poverty, depression and poor health caused by unemployment and access to a reliable, inexpensive and efficient transport system can give poor people more access and opportunity to essential services and resources.

Kearns & Parkinson (2001) defined "neighbourhood" as an area of a 5 or 10 minute walk from an individual's home, where the salient features of the neighbourhood are present. These salient features are present in the three scales of the neighbourhood as stated by the authors which comprise the home (place of relaxation and recreation of self, making connections with others), locality (residential activities, social status and position) and urban district or region (landscape of social and economic opportunities).

Healey (1998) outlined "neighbourhood" as a 'key living space through which people get access to material and social resources, across which they pass to reach other opportunities and which symbolises aspects of the identity of those living there, to themselves and to outsiders'.These explanations help us to understand neighbourhoods in terms of identification with the area and also give a spatial definition to it. Kearns & Gesler (1998) in their book "Putting health into place: landscape, identity, and well-being" examined how the sense of place, community identity and community mobilisation for better health service provision within the Hokianga indigenous community in New Zealand was successful when threats to disrupt health services to the community were proposed by the authorities.

Chappell et al. (2004) looked into how healthy neighbourhoods can be conceptualised and stated they comprise of local environments which support the physical and mental health (broadly defined), and health behaviours, of individuals. The authors further explained that a 'healthy neighbourhood' is an umbrella concept capturing elements of the local area which contribute to the quality of life, and health status in particular of the residents dwelling in the neighbourhood.

The residents of a healthy neighbourhood support one another in carrying out life functions and achieving their potential (Nozick 1998) and the neighbourhood environment 'provides opportunities for healthful choices, behaviours and encouragement for making choices that will help neighbourhood residents achieve their highest potential' (Wilcox & Knapp 2000). Likewise unhealthy neighbourhoods would feature a variety of stressors like poor air, water quality, substandard housing conditions, exposure to mould dust or pest infestation, lack of access to nutritious food

and safe places to exercise which may contribute to bad dietary habits and obesity.

Ellen et al. (2003) hypothesise that neighbourhoods may primarily influence health: first, through relatively short term influences on behaviours, attitudes, and healthcare utilisation, thereby affecting health conditions that are most immediately responsive to such influences; and second, through a longer-term process of "weathering," whereby the accumulated stress, lower environmental quality, and limited resources of poorer communities, experienced over many years, erodes the health of residents in ways that make them more vulnerable to mortality from any given disease. Thus, looking back to the healthy/unhealthy neighbourhood's discussion above, local contexts can have both negative and positive effects on people's health.

Ellen et al. (2003) further noted that neighbourhoods shape health in four pathways through:

(1) Neighbourhood institutions and resources

(2) Stresses in the physical environment

(3) Stresses in the social environment

(4) Neighbourhood based networks and norms.

The stressors from the physical and social environment will be explained in detail later in sections 2.4.1.6 and 2.4.1.7.

When the social environment is taken into consideration, people living in deprived communities experience worse health outcomes on average than those living in more prosperous areas (Stafford & Marmot 2003; Marmot 2015). Studies have found that

residents of poorer areas suffer from higher rates of heart disease, respiratory ailments, cancer, and overall mortality (Adler et al. 1993; Crombie et al. 1989; Devesa et al. 1983; Harburg et al. 1973; Jenkins, 1983).

Additionally, neighbourhoods play an important role in infectious diseases as they are spread through human populations by a large number of routes that vary according to the well-known triad of agent, host and environment (Last, 2001). This provides an opportunity to examine the intersection between ecological setting and human behaviours given the number of infectious organisms, the number of ecological settings, and the variations in the ways people organise their settlements and the possible permutations and combinations of such intersections is very large (Fullilove 2003).

Neighbourhood based institutions, resources, networks and norms comprise of social support and connectedness, employment, leisure opportunities, and health and social services (Raphael et al. 1996). The characteristics of the social relationships among the residents of a neighbourhood (like mutual trust and connectedness) are more likely to work together for access to clean and safe public spaces, healthy behaviours and maintain informal social controls like discouraging crime, smoking or alcohol use among youths etc.

The next subsection explores health inequalities as a prevailing factor existing in neighbourhoods.

2.4.1.5 Neighbourhood contexts and Health inequalities

Health inequalities persist in developed countries, despite general improvements in

health outcomes across the population (Department of Health, 2008). Shouls et al. (1996) in their study, modelling health inequality in long term illnesses in the UK, noted that on average, populations in more affluent areas have better health ; and the health gradients between rich and poor individuals were particularly strong in more privileged areas like London and metropolitan hinterlands compared to the deprived north of the UK.

Poor families are likely to live in less desirable neighbourhoods, because they are cheaper but these places may feature poorer facilities, housing quality and access to essential resources. People living in poor neighbourhoods are in worse health, on average, than residents of richer neighbourhoods (Pickett & Pearl 2001; Riva et al. 2007). This has been found for total and coronary heart disease (CHD) mortality (Diez-Roux et al. 1997), CHD prevalence and risk factors (G Davey Smith et al. 1998), mental health and functioning (Beard et al. 2009; Kim 2008) where the authors pointed out that depression was linked to neighbourhood characteristics. Studies on health behaviours revealed that residents of poor neighbourhoods exhibit characters that are associated with worse health on average and health behaviours such as bad diet, lack of physical activity, smoking and alcohol consumption were associated with the type of area an individual resided in (Amuzu et al. 2009; Ecob & Macintyre 2000; Ellaway & Macintyre 1996).

Structural factors such as employment conditions and education also influence health, and because they are unevenly distributed, they play a role in the creation and maintenance of health inequalities. Interventions aimed at these 'upstream determinants' are therefore required to tackle health inequalities (Acheson 1998; Graham 2004). These

health variations are associated both with the socio-economic characteristics of individual people and also with the socio-economic characteristics of the wider communities, or places, in which they live (Curtis et al. 2004). While neighbourhoods are a really strong determinant of the health of people, other factors operating at a larger scale (employment opportunities, welfare benefits, healthcare provision) also have a strong effect.

Chandola (2012), studied the spatial and social determinants of urban health in low, middle and high income countries and found that even in the UK, if an individual lives in a neighbourhood that is surrounded by deprivation, there is a higher risk of mortality. He also noted that, however, neighbourhood deprivation is not synonymous with poor social capital and some communities can be resilient to the health damaging aspects of living in a poor neighbourhood if they have access to social support and other social ties.

Macintyre et al. (1993) postulated that the environmental characteristics in poorer areas are detrimental to health and healthy living. The authors have described this as 'deprivation amplification' (Macintyre 2007), a pattern by which a range of resources and facilities which might promote health are less common in poorer areas (an extension of the 'inverse care law' first propounded in relation to health care (Tudor Hart 1971). The author stated that in areas with most sickness and death, general practitioners have more work, larger lists, less hospital support, and inherit more clinically ineffective traditions of consultation, than in the healthiest areas; and hospital doctors shoulder heavier caseloads with less staff and equipment, more obsolete buildings, and suffer recurrent crises in the availability of beds and shortages

in replacement staff. These trends can be summed up as the inverse care law: that the availability of good medical care tends to vary inversely with the need of the population served (Tudor Hart 1971).

Investigating whether neighbourhood deprivation and health affected people equally, Stafford & Marmot (2003) found that living in a deprived neighbourhood may have the most negative health effects on poorer individuals, possibly because they are more dependent on collective resources in the neighbourhood. Their findings suggest that initiatives to tackle health inequalities will need to address not only an individual's socioeconomic situation but should also consider the way in which the residential environment magnifies the effect of personal poverty. It is noteworthy as it connects to the context/composition debate where it is seen that it is not possible to separate individual and neighbourhood impacts on health as they are interconnected. Not everyone in an area will be affected in the same way when we look in deeper from a neighbourhood level perspective. Interestingly, Haynes et al. (2000) investigated deprivation and poor health in rural areas and concurred that health is equally dependent on socio- economic status in urban wards and comparable rural areas also.

In a study to understand why equally deprived UK cities (Glasgow, Liverpool and Manchester) experience different health outcomes, Walsh et al.(2010) found out that that the deprivation profile of Glasgow has not changed significantly relative to Liverpool and Manchester in recent decades; however, the mortality gap appears to have widened since the early 1970s, indicating that the 'Scottish effect' (a term used to describe the higher levels of poor health experienced in Scotland over and above and that explained by socioeconomic circumstances) may be a relatively recent observed

phenomenon. 'The Scottish Effect' and 'The Glasgow Effect' were terms coined by researchers in relation to a specific epidemiological issue – the higher levels of mortality in Scotland (and especially in and around Glasgow) compared to elsewhere in the UK that cannot be explained in terms of differences in material deprivation and socioeconomic circumstances (The Scottish Public Health Obsevatory, 2015). Walsh et al. (2010) concluded that while deprivation is a fundamental determinant of health and, therefore, an important driver of mortality, it is only one part of a complex picture. As currently measured, deprivation does not explain the higher levels of mortality experienced by Glasgow in relation to the two very similar UK cities of Liverpool and Manchester.

In another study exploring a multilevel approach to health inequalities incorporating attitudes and area features, Mitchell et al. (2000), opined that the geography of area effects on ill health is not defined purely by its spatial characteristics but also its social characteristics. Their paper outlined that living in an area where deindustrialisation has taken place will significantly increase an individual's chances of reporting ill health. The authors noted that in families traditionally supported by the industries, with the simultaneous sudden loss of income of the father and employment prospects for the son compounded the health burden of a life working in or living near a heavy industry. The unemployment and burden of life could be spatially concentrated and seen in all areas where manufacturing and mining was present. This contributes to the evidence of an `area effect' to the debate on the role of area in health. Their evidence suggests that health is a function of characteristics of both individual and area of residence as well as the individual's sense of belonging to their place.

A study by Hou et al. (2005) explored neighbourhood inequality, neighbourhood affluence and population health in Canada using cross-sectional household data from Statistics Canada's 1996/97 National Population Health Survey (NPHS) and neighbourhood characteristics estimated from the 1996 Census. They found that the negative "ecological" correlation between average neighbourhood health and neighbourhood income inequality is the result not only of compositional differences among individuals but also of contextual neighbourhood effects associated with low and high inequality neighbourhoods. On the contrary, Ross et al.(2004) explored neighbourhood influences on health in Montreal, Canada and found that neighbourhoods do indeed exert an effect on health status above and beyond individual sociodemographic and behavioural characteristics.

Since the evidence from the literature suggests that living in a deprived neighbourhood is associated with poor individual health, it is important to identify some of the connecting mechanisms that link them together, which are explained in the next section.

2.4.1.6 Physical Stressors in the Neighbourhood Environment

The urban physical environment includes the built environment, the air city dwellers breathe, the water they drink and bathe in, the indoor and outdoor noise they hear, the parkland inside and surrounding the city, and the geological and climate conditions of the site where the city is located. What distinguished the twentieth century from previous ones and cities from non-urban areas in part is the degree to which humans have become the primary influence on the physical environment(and vice versa) (McNeill 2001).

One of the most common discussions on how physical neighbourhood characteristics influence health would involve the proximity of polluting factories and toxic waste sites, which may increase people's chances and make them vulnerable to contracting cancer or other illnesses. These tend to be more commonly seen in low income areas like living near hazardous waste facilities, landfill sites, etc. (Anderton et al. 1994; Vrijheid 2000).

Other features noticeable in deprived neighbourhoods include ageing and poorly maintained neighbourhood locales, crumbling pavements, decaying stairwells, and dangerous playgrounds which are likely to increase the risk of accidents. The quality of municipal services such as fire protection, sanitation, and even parks, may also influence the health and safety of residents (Wallace & Wallace 1990).

The human built environment includes housing, which can influence both physical and mental health, including asthma and other respiratory conditions, injuries, psychological distress, and child development (Krieger et al. 2002; Northridge et al. 2003; Evans & Stoddart 2003). Given the large proportion of time spent within the home, housing is both a key environmental influence upon health and a key health resource (Blackburn 1991).

Marsh et al. (2000) explored housing deprivation and health in a longitudinal analysis and noted the poor housing conditions are frequently encountered alongside other indicators of social disadvantage. As a consequence it has been proved to be difficult to isolate the nature and magnitude of the independent effect of poor housing upon health. Additionally, they opined that the effects of poor housing on health may be indirect or take several years to manifest themselves. Children may be more affected by

dampness and mould in the environment than are adults, and this may affect rates of respiratory disease (Dales et al. 1991). The link between health and housing has moved up the UK policy agenda. The Acheson Report (1998) highlights housing and environment as key areas for future policy development if health inequalities are to be reduced.

In an observational population study by Mitchell et al. (2008) to understand the effect of exposure to natural environment on health inequalities, they found that populations that are exposed to the greenest environments (parks, open spaces, agricultural land excluding domestic gardens) also have lowest levels of health inequality related to income deprivation. They concluded that physical environments that promote good health might be important to reduce socioeconomic health inequalities.

2.4.1.7 Social Stressors in the Neighbourhood Environment

The social environment involves both the structure and characteristics of relationships among people within a community. Components of the social environment include social networks, social capital, segregation, and the social support that interpersonal interactions provide (Galea et al. 2005).

A city's social environment can both support and damage health through a variety of pathways (Leviton et al. 2000; Freudenberg 2000; Geronimus 2000). For example, in densely populated urban areas, behaviours that influence health like smoking, diet, exercise, and sexual behaviours are common among individuals (King et al. 2003). Social support can buffer the impact of daily stressors, and provide access to goods and services that influence health (e.g., housing, food, informal health care)(Berkman et al. 2000).

Mair et al.(2010) found out from the Chicago Community Adult Health Study that neighbourhood stressors (presence of derelict and vacant buildings, litter, graffiti) give visual cues that a neighbourhood is not safe and desirable which in turn can make the neighbourhood environment more stressful. Coupled with the perceptions that the neighbourhood environment was unsafe, violent, or highly disordered it could increase feelings of distress, both directly and indirectly, through feelings of powerlessness and fear. These factors and the lack of social support were associated with depressive symptoms.

Exposure to crime and violence has been shown to increase stress, as has exposure to other social conditions such as noise (Evans 1984). Stress may exacerbate hypertension and other stress related disorders, and may lead people to engage in smoking and other unhealthy behaviours as strategies of stress reduction. The accumulated effects of stress may also weaken the immune system and increase vulnerability to disease and disability (Geronimus 1991).

Another alternative path by which neighbourhood crime and violence levels may influence behaviour is seen in more dangerous neighbourhoods where expected life-spans are reduced and residents may feel they have less to lose from health risks such as smoking, that typically take a long time to manifest themselves (Dow et al. 1995; Ganz 2000).

Geronimus's theory of 'weathering' can explain in some way the apparently strong effect of neighbourhoods on the most distal of health outcomes which is mortality. Geronimus (1991) argues that adverse social and economic conditions such as discrimination and poverty produce cumulative socioeconomic disadvantage via higher

stress, inferior health resources, and other disadvantages. These disadvantages accumulate to produce maturing health effects over extended periods of time and can result in more fragile health and thus, greater vulnerability to disease processes (e.g. smoking, drug abuse and sexual risk behaviours).

Looking at discrimination and persistent poverty, it may be possible to infer that long term weathering effects and continued exposure to harmful neighbourhood effects may wear down an individual's health and well-being over time; and weaken the individuals' abilities to recover from disease. This type of neighbourhood effect may not strongly express itself in a morbidity study of a single disease as cancer, chronic heart disease or lung disease as single disease studies are at the mercy of rare events and may lack sufficient statistical power, or at best may find a relatively small independent effect of neighbourhood. But when neighbourhood effects are aggregated across diseases, and when the research focus shifts from morbidity to mortality, it's possible to see how neighbourhood effects can be distinguished (Ellen et al. 2003).

2.4.1.8 Neighbourhood contexts and health pathways

The neighbourhood has a multidimensional impact on health (Parkes & Kearns 2006). It is possible to conceive a pathway of how the social and physical characteristics of the neighbourhoods can influence each other. For example the presence of a derelict neighbourhood with bad quality public spaces can influence the nature of interactions between the individuals in the area as they may avoid frequenting the place altogether. This in turn decreases the ability of the neighbours to advocate the need to improve those spaces to the local authorities. Higher level of crime and social disorder are common in deprived areas making it more stressful and dangerous to live in them.

Access to local amenities may be worse than in more affluent areas, and there may be fewer jobs available. Cultures influencing health behaviours and employment may differ, and both residents and outsiders may perceive neighbourhoods negatively (Kling et al. 2007). Different features of internal housing conditions have the potential to influence health, for e.g. cold and damp conditions may cause or exacerbate respiratory health conditions. Poisoning may be caused by lead piping, lead paint in old buildings or carbon monoxide by faulty heaters at home.

Mitigating these stressors would require a collective approach. An interesting study by Beck et al. (2010) explored how area regeneration would impact on health in a Scottish context. The policy analysis and interviews revealed a holistic approach to a complex problem and identified a need for action to improve housing, neighbourhoods and services, education, employment, community participation and social issues. Improved health was identified as an emergent property. Interviewees identified a need to augment the established structural components with a more person centred approach, fostering confidence and higher aspirations, but were uncertain how to achieve this. The interviews revealed a lack of confidence that current practice would deliver all the components of the holistic model (Beck et al. 2010).

Pampalon et al. (2007) in their study on perception of place and health looking at differences between neighbourhoods in the Quebec City region noted that people's distribution across areas of residence is neither random nor totally intentional. As a reflection of both chances and choices, residential decisions (or the absence thereof) are shaped by the correspondence between individual's economic means and lifestyle preferences; neighbourhood characteristics pertaining to the availability of resources

and services; the quality of the physical and built environments such as housing; and other socially oriented criteria such as reputation, history or the presence of social connections (Pampalon et al. 2007).

Fullilove (2003), in her study on infectious diseases and neighbourhood health noted that neighbourhoods are not stable creations. They are constantly recreating themselves as people, goods, and institutions enter and exit. In that dynamic process, vulnerability to infection will rise with the introduction of new infectious agents and new social problems; but will also fall with the introduction of social and scientific resources to limit the spread of illness. The author notes that the concentration of illness and the construction of neighbourhoods that limit the free flow of resources will increase the burden of disease not just in the affected neighbourhood but throughout the larger embedding society and perhaps throughout the world.

Research which tries to classify areas and their resident populations, in order to explore area variation in health, needs to take account of how people differ in respect to interactions with their community (Mitchell et al. 2000).

2.4.1.9 Summary

Neighbourhood effects on health operate at a variety of scales as seen from the evidence this literature review has presented. There are many reasons to suppose that residential location matters to health. But the fact that people choose their locations makes it difficult to identify causal relationships between features of locations and health outcomes. Thus, it may be possible to infer that the poor are more likely to live in areas with undesirable features, such as pollution, and are also more likely to engage in more

negative health behaviours. This review highlighted that individuals or families are more likely to be poor or stay poor because of where they live. Likewise, it's possible to see this context from another perspective which questions whether living in a deprived neighbourhood can actually cause poverty or harm health. It's possible to understand that people who move into a neighbourhood differ from those in other neighbourhoods before they arrive, and those who leave differ from those who stay.

In order to achieve tangible results, health policy should target 'places' as well as 'people'; and that policies aimed at improving the quality of housing, access to amenities, neighbourhood safety, and social cohesion may help to reduce health inequalities where the contextual and compositional attributes of the place has to be taken into consideration (Macintyre et al. 2002; Poortinga et al. 2008). Many of the studies investigating neighbourhood effects and health have used quantitative methods suited to the study of neighbourhood health effects which include multi-level analyses and the use of Geographic Information Systems (GIS) (Diez-Roux et al. 2010).

Indeed, much geographical health research has focused on measuring material and social deprivation within and between places using indicators (e.g. unemployment, home ownership, education, income inequality and car ownership) which produce a 'score' for an area and additional information (e.g. health outcomes such as coronary heart disease mortality) can be added. The use of these indices (Morris & Carstairs 1991) or the Scottish Index of Multiple Deprivation-SIMD (The Scottish Government 2012) can show a relationship between health and place (Brown et al.2009; Elliott et al. 2001) and when combined with GIS, the examination of 'place' becomes ever more detailed.

However, 'neighbourhood' is conceived of as a score, rather than as a network of social

relations and interactions or as a context for individual's lived lives. Thus, neighbourhoods (or local places) are clearly an important scale at which to consider the complex determinants of health, and how health issues are managed. Geography and Public Health insights can make a significant contribution as existing clinical studies cannot capture local place factors and hence one focus of this research was exploring local place scale influences on health.

The next stage of the review looks specifically at health and place (environmental, social and management) contextual factors in relation to asthma.

2.4.2 Environmental, Social and Management factors influencing Asthma

The previous review stage described how place contexts influenced health and looked closely at neighbourhood contexts. The following review takes a step further to look specifically at asthma and describe how the environmental, social and management factors that constitute the context of place in relation to asthma can have the potential to shape its prevalence and management.

First, the most common triggers in the physical and social environment identified from the review are described and the review concludes with the factors that influence the management of asthma at the healthcare and patient level.

Asthma is a multifactorial disease influenced by a variety of factors from the physical and social environment. The factors from the physical and social environment most likely to exacerbate an attack of asthma can be from an outdoor or indoor setting acting upon individually or in combination as shown in the table 2.1 below:

Outdoor Environmental Factors	Indoor Environmental Factors	Social and Clinical Management Factors
1. Ozone 2. Pollen 3. Particulate Matter 4. Temperature 5. Relative Humidity 6. Sulphur Dioxide 7. Nitrogen Dioxide	1. Dust mites 2. Dampness 3. Moulds 4. Pets, Rodents and Roaches 5. Environmental Tobacco Smoke 6. Volatile Organic Compounds (VOC)	1. Structural factors e.g. socioeconomic disadvantages 2. Physical conditions e.g. dilapidated housing 3. Differential exposures to psychological stress e.g. violence, discrimination 4. Behavioral factors e.g. adherence to medications and inhaler techniques

Table 2.1 Common Environmental, Social & Clinical Management Factors Influencing Asthma

2.4.2.1 Outdoor and Indoor Environmental Triggers

The literature review identified the different physical environmental triggers for asthma present in the physical environment and are described below:

2.4.2.1.1 Ozone, Pollen and Particulate Matter

Ozone is present separately in two regions of the Earth's atmosphere, at the ground level and in the upper regions of the atmosphere. Both types of Ozone have the same chemical composition O3. While upper atmospheric Ozone protects the earth from the sun's harmful rays, ground level Ozone is the main component of smog. Atmospheric Ozone is formed in the atmosphere as a result of photochemical air pollution by the interaction of primary pollutants such as volatile hydrocarbons,

halogenated organics and oxides of Nitrogen in the presence of sunlight (USEPA, 2008). Ozone can also be found indoors and ambient ozone is the main contributor to indoor Ozone concentrations. Therefore, indoor concentrations of Ozone are directly related to outdoor concentrations and show significant seasonal variability (Breysse et al. 2010). Indoor sources of Ozone are uncommon, but include ionizers or Ozone generators, which are sold as air freshening or air cleaning devices, and xerographic copy machines found in offices, schools, and some home offices (Carpenter 2004).

Ozone exposure compromises the airway (the tubes that carry air to the lungs) growth, development and exacerbates the allergen response to favour intermittent airway obstruction and wheeze in patients with asthma. It damages the inner lining of the lungs so that the allergen that can cause asthma sets in faster. Individuals exposed to ambient atmospheric Ozone levels during high Ozone season experienced worse symptoms and had lower quality of life scores, worse lung function with increased airflow obstruction and enhanced allergic inflammation (Khatri et al. 2009).

An observational study (Ponka & Virtanen 1996) looking at asthma and ambient air pollution in Helsinki involving both adults and children found out that hospital admissions were observed for Ozone levels in all children under 14 years, and for SO_2 levels in 15-64 year olds and among those older than 64.

A French study (Rage et al. 2009) examined air pollution and asthma severity in adults; it recruited patients living in predefined geographical areas from primary care chest clinics in five French cities (Paris, Lyon, Marseille, Montpellier and Grenoble) between 1991 and 1995. The results observed associations between asthma severity and air pollution, in particular for ozone which supported the study hypothesis that air

pollution especially from Ozone increased asthma severity. People with asthma living in places with proximity to high traffic pollution are at the risk for worsening their asthma.

Pollen is a powder like substance produced by certain types of trees, grasses, weeds and flowers for pollination and can trigger asthma in some individuals. Whole pollen grains are too large to penetrate the small airways (Wilson et al. 1974). However, episodes of wet weather during the pollen season can trigger pollen grains to emit respirable particles that can penetrate into the lower airways where they may trigger asthmatic responses (Taylor et al. 2004).

Pollen grains or plant-derived paucimicronic components carry allergens that can produce allergic symptom. They may also interact with air pollution (particulate matter, ozone) in producing these effects. Furthermore, airway mucosal damage and impaired mucociliary clearance induced by air pollution may facilitate the access of inhaled allergens to the cells of the immune system (D'Amato et al. 2005).

In a cohort study exploring air pollution and seasonal asthma in in two Spanish cities of Ciudad Real and Puertollano, Feo Brito et al. (2007) concluded that environmental pollution appears to lead to a poorer clinical course of pollen allergic asthma in the patients in Puertollano and were associated with an increased risk of asthma symptoms in pollen-allergic asthmatic patients compared with a similar group from Ciudad Real as the most significant relationship occurs with Ozone and it would be advisable to reduce the levels of Pollen also.

A study by Gonzalez-Barcala et al. (2013) explored the influence of pollen levels on

hospitalisations for asthma in Spain and found out that high maximum temperature and low humidity were associated with lower risk of asthma admissions. High mean pollen levels exerted a moderate effect and high maximum pollen levels led to a dramatic increase of hospital admissions due to asthma, especially among females. In conclusion, environmental pollen level increased the risk of asthma hospital admissions.

Particle pollution (also called particulate matter or PM) is the term for a mixture of solid particles and liquid droplets found in the air. Some particles, such as dust, dirt, soot, or smoke, are large or dark enough to be seen with the naked eye. Others are so small they can only be detected using an electron microscope. Particle pollution includes "inhalable coarse particles," with diameters larger than 2.5 micrometres and smaller than 10 micrometres and "fine particles," with diameters that are 2.5 micrometres and smaller (USEPA, 2008). Particulate matter originates from a variety of natural and man-made sources. Natural sources include pollen, spores, bacteria, plant and animal debris, sea salt, and dust from the earth's crust. Manmade sources consist mostly of combustion by-products from factories, motor vehicles, and power plants. Smoking is a major contributor to indoor particulate matter. Additional sources include cooking exhaust, wood-burning stoves and fireplaces, cleaning activities that re-suspend dust particles (e.g., sweeping), and penetration of outdoor particles into the indoor environment (Diette et al. 2008.

Among people suffering from asthma, ambient particulate matter has been linked to exacerbations, chronic symptoms, and decline in lung function. Fine particulate matter fraction, outdoor coarse particulate matter is associated with a greater risk of

hospitalization for childhood asthma than outdoor fine particulate matter (Cohn et al. 2005).

A time series study by Nastos et al. (2010) which examined outdoor particulate matter and childhood asthma admissions in Athens, Greece provided evidence of the adverse effect of PM10 on the rates of paediatric asthma exacerbations and hospital admissions thus ascertaining the fact that places where traffic pollution was high, the young children with asthma were at increased risk for worsening their condition.

2.4.2.1.2 Nitrogen Dioxide, Sulphur Dioxide and Temperature

Nitrogen Dioxide (NO_2) is formed from primary emissions of oxides of nitrogen. Automobile exhaust is the main source of ambient NO_2 in most urban environments. Other sources include local industry, power plants, and forest fires. There is growing evidence that elevated ambient NO_2 is associated with increased asthma symptoms, exacerbations, and hospitalizations, and with lower lung function, particularly in vulnerable populations, including young children and the elderly (Villeneuve et al. 2007).

Nitrogen dioxide (NO_2) is a gaseous product of high-temperature combustion. It has many indoor sources, including gas stoves, space heaters, furnaces, and fireplaces, and has been linked to respiratory health effects (USEPA, 2008). Higher indoor NO_2 concentrations influence respiratory morbidity, including wheeze, chest tightness, breathlessness, and daytime and night time asthma attacks (Breysse et al. 2010).

An analysis of asthma hospitalisations, air pollution, and weather conditions in Los Angeles County, California by Delamater et al. (2012) observed that traffic-related pollutants, CO and NO_2, were significant and positively correlated with asthma

hospitalisations. Breysse et al. (2010) concluded that that indoor particulate matter (particularly the coarse fraction), NO_2, and mouse allergen exposure are important determinants of asthma morbidity in urban environments in a study on air pollution and asthma in children.

A cohort study (Luevano et al. 2012) examining the effect of air pollution on asthmatic children along the US–Mexico border observed small but consistent associations between NO_2 and numerous pollutant metrics, with estimated increases in NO_2 ranging from 1% to 3% per interquartile range increase in pollutant concentrations thus providing preliminary support for the use of air pollution monitors close to schools to track exposure and potential health risk in this population.

Sulphur dioxide (SO_2) is a non-inflammable, irritant, ambient air pollutant colourless gas mainly formed by the combustion of high sulphur coal or oil. Prolonged exposure to SO_2 is one factor that might contribute to airway inflammation and bronchial hyper activity, thereby predisposing to episodes of asthma in children (Tseng et al.1990).

In an observational study that explored asthma and ambient air pollution in Helsinki, Ponka & Virtanen (1996), observed positive associations with admissions were observed for Ozone levels in all children under 14 years, and for SO_2 levels in 15-64 year olds and among those older than 64.

Both hot and cold temperatures are considered to cause a rise in asthma exacerbations in individuals. This is partly due to the fact that a variety of other factors in conjunction with a rise or fall in temperature have adverse effects on an individual with asthma. It is possible that higher temperatures are associated with higher levels

of allergens such as house dust mites, pollen and moulds thereby increasing asthmatic attacks. In cold temperatures, asthma attacks and respiratory symptoms tend to increase with a rise in emergency visits to the hospital (Moineddin et al. 2008).

A Chinese observational study by Guo et al. (2012) examined the association between cold spells and paediatric outpatient visits for asthma in Shanghai and concluded that there was a significant relationship between cold temperatures and paediatric outpatient visits for asthma. The cold effects on children's asthma were observed at different lags. The lower the temperatures, the higher the risk for asthma attacks among children and cold temperatures, particularly cold spells, significantly increase the risk of paediatric outpatient visits for asthma.

2.4.2.1.3 Relative Humidity, Thunderstorms, Dampness, Mould and Dust Mites

Raised ambient humidity promotes the survival of viruses in droplet spray that cause respiratory infections when inhaled and in turn can trigger an asthmatic attack in an individual suffering from asthma (Arundel et al. 1986).

Observations that a thunderstorm occurring during pollen season can induce severe asthma attacks in patients with asthma. After rupture by thunderstorm, the pollen grains may release part of their cytoplasmic content, including inhalable, allergen-carrying paucimicronic particles and trigger asthma (D'Amato et al. 2005).

Building dampness and indoor mould growth are common in many countries; both in dwellings and other buildings, and reviews have concluded that there is evidence for an association between damp housing conditions and respiratory symptoms in adults (Bornehag et al. 2001). In the European Community Respiratory Health Survey, 7104

young adults from 13 countries in Europe were followed prospectively for 9 years; Norbäck et al. (2013) found out that dampness and indoor moulds in dwellings are related to an increased incidence of asthma in adults. The effect seems to be stronger in those with multiple sensitivity, and in those sensitised to moulds. About 5–15% of adult onset asthma could be attributed to dampness-related exposure at home. One meta-analysis concluded that building dampness and indoor moulds are associated with approximately 30–50% increases in a variety of respiratory and asthma-related health outcomes (Fisk et al. 2007).

Evans et al. (2000) undertook an epidemiological study to understand the relative importance of damp housing in relation to adult health and concluded damp housing was associated both with longstanding illness and with asthma specifically. These findings relate with the physical and social stressors present in neighbourhood contexts as discussed previously (Mair et al. 2010).

Dust mites are arachnids that infest bedding, carpet, upholstered furniture, and fabric. Their main food source is human skin scales, and they grow best in warm, humid environments (Arlian 2001).

Like many other allergens, exposure to dust mite allergen in sensitised patients is associated with poorer lung function, greater medication requirements, and more asthma symptoms. In contrast to other allergens, there is evidence that dust mite allergen leads to the development of asthma, in addition to exacerbating pre-existing asthma in dust mite sensitised patients (Custovic et al. 1996). Place contexts especially living in derelict conditions in individuals with asthma brings into prominence how where and how you live would matter for an individual's health.

2.4.2.1.4 Environmental Tobacco Smoke, Volatile Organic Compounds and Pets

Environmental tobacco smoke (ETS) is a dynamic, complex mixture of more than 4000 chemicals found in both vapour and particle phases. Exposure to ETS is common in adults and has also been associated with an increased risk of asthma morbidity (Jie et al. 2011).

In a cohort study by Teach et al. (2006), that assessed children with asthma seen in an urban emergency department at the hospital, concluded that there were high levels of exposure to ETS and potential allergens among a high morbidity population of urban children with asthma. In a case control study by Gee (2005), that examined the influence of Environmental Tobacco Smoke and asthma in a community population indicated that tobacco smoking is likely to make a considerable contribution to levels of particulate materials in the homes that would eventually influence asthmatic attacks in individuals. Smoking is a common social factor present in deprived areas (Ellaway et al. 2012; Burr et al. 1997) and is integral when considering both physical and social environmental triggers for asthma as it is present in both contexts.

The World Health Organization's definition of VOCs includes all organic compounds (substances made up of predominantly carbon and hydrogen) with boiling temperatures in the range of 50 degrees to 260 degrees Centigrade, excluding pesticides. VOCs, toxic gases or vapours emitted at room temperature from certain solids or liquids, involve a variety of chemicals e.g. formaldehyde (FA), benzene, and perchloroethylene, some of which may have acute or/and chronic adverse effects on individuals with asthma. Cigarette smoke, cleaners, floor/wall coverings, paints, and room deodorizers are major sources of indoor VOCs (Jie et al. 2011).

A cross sectional study by Arif et al.(2007) looking at the association between personal exposure to volatile organic compounds and asthma among US adult population concluded that environmental exposures to VOCs, especially aromatic compounds, were associated with adverse respiratory effects that would trigger asthma.

Cats and dogs are common furred pets, although families often keep other species of furred pets as well. Cat and dog allergens can be found in virtually all homes, but, not surprisingly, homes with pets contain much higher levels of the allergens than homes without pets. Both cat and dog allergens can be passively transferred, because they are carried on small particles that remain airborne and adhere to surfaces and clothing.

Diette et al. (2008) observed in a paper looking at the environmental issues in managing asthma that it was quite common allergic sensitisation to furred pet allergens in some populations where more than 60% of children with asthma were sensitised to cat or dog allergens. They also noted that the combination of widespread exposure to pet allergens and high prevalence of allergic sensitisation suggested that a substantial proportion of patients with asthma are at risk for cat or dog allergen-induced asthma symptoms.

2.4.2.1.5 Common Triggers acting in combination with other factors

In a Welsh observational study by Wurmb et al. (2007), exploring the influence of social deprivation and air pollutants on serious asthma found modest associations between air pollutants and areas of social deprivation across Wales. This further suggests that the stronger association between social deprivation and serious asthma is linked more strongly with social factors than with air pollutants. They also noted that high levels of deeply inhaled pollutants from smoking are likely to overwhelm any

effect of background air pollutants in causing acute asthma attacks.

Hwang et al. (2012) examined residential environmental risk factors for childhood asthma prevalence in metropolitan and semirural cities in Korea and found that there were significant differences in the prevalence of asthma according to socioeconomic factors, such as size of the house, home ownership, and annual income. This was consistent with the results of the study by Weitzman et al. (1990), in the United States, in which the prevalence of childhood asthma was found to be higher in students residing in smaller houses and in those with a lower economic status. They concluded that residential environmental risk factors and the area of residence affect the prevalence of childhood asthma.

In a case control study by Lindfors et al. (1995) examining indoor environmental risk factors in young individuals with asthma, results indicated a combination of high dose exposure to cat and/or dog, environmental tobacco smoke and damp housing was associated positively. Raised indoor humidity has been shown to reflect low air exchange, which may also lead to increased doses of inhaled aeroallergens and tobacco smoke, and contribute to the interaction between the three risk factors.

In a systematic review on the influence of indoor factors in dwellings on the development of childhood asthma by Heinrich et al. (2011), the results pointed out that the most consistent finding for an induction of asthma in childhood is related to exposure to environmental tobacco smoke, living in homes close to busy roads, and in damp homes where there are visible moulds. Exposure to pet-derived allergens and house dust mites are very common and thought to be related to asthma onset. These findings show the variety of scales that a person with asthma can be exposed to.

2.4.2.1.6 Summary

There is now a large body of literature supporting a linkage between exposure to pollutants and asthma. However, the extent and significance of this relationship varies considerably between pollutants, location, scale of analysis, and analysis methods. Though most studies included in this review utilised quantitative methods that signified the relationships between asthma and environmental triggers, there were no studies that employed qualitative methods to understand the significance and implication of environmental triggers on asthma from the practitioner or patient perspective. Outdoor environmental pollutants like Ozone, Nitrogen Dioxide and Particulate Matter constituted as the leading trigger in most studies suggesting the importance of how outdoor traffic emission contributed to asthma prevalence in most study locations.

The above review demonstrates the many factors that shape asthma prevalence from the physical environment especially in relation to place contexts and at a range of sites and scales (from overall air pollution, to the very small scale of furniture in the home). It could be understood that some are related to individual behaviours or deprivation (e.g. poor housing), or even infrastructure (e.g. air pollution from cars). A combination of these triggers combined with the effect of pollution and lower socio-economic status (SES) signify a potential mechanism by which all these factors act in tandem and affect asthma prevalence and morbidity making it important to acknowledge the important role played by place contexts. Most studies have linked the relationship between these factors and asthma outcomes but not how these factors are understood and responded to by those involved in the management of asthma-health practitioners

or patients which needs further research. The next section adds another layer to this context looking at how factors from the social environment would influence asthma.

2.4.2 The Social Factors influencing Asthma

The literature search looked at identifying the different social components present in the environment of an area that could influence an individual with asthma. The results from the review described in this section explain the different contexts present that formed an integral part of the social environment influencing an individual with asthma. The most common social factors identified from the reviews are discussed in the next subsections.

2.4.2.1 Deprivation, Socioeconomic status and Asthma

People can be deprived of adequate education, good quality housing, rewarding employment, sufficient income, good health and opportunities for enjoyment. Disadvantaged areas are locations in which people tend to be relatively poor and likely to suffer from misfortunes such as ill health and general social misery (Dorling 1996). Since the 1980s to identify relatively deprived areas, various indexes have been devised including the Jarman Underprivileged Area Index (Jarman 1983), the Townsend Index (Townsend 1987), the Carstair's Index (Carstairs & Morris 1989) and the Scottish Index of Multiple Deprivation (The Scottish Government 2012). Mainly at the electoral ward and datazone scale, these indices are predominantly based on a composite of census derived variables which act as indicators of relative conditions between areas. The resulting deprivation scores are highly influential for allocating public resources and regularly used as explanatory variables in health outcomes (Norman et al, 2005 ; Boyle

et al, 2001).

Deprivation present in an area was one of the main social factors that was seen to be associated with asthma outcomes in a number of studies that was gathered in this review. In a study on hospital admission rates for asthma and respiratory disease in the West Midlands and their relationship to air pollution levels, Walters et al. (1995) found that deprivation, as measured by the Townsend deprivation index, is a significant predictor of hospital admission rates for respiratory disease in older individuals and children. Other studies have also found deprivation to be a major factor that was associated with asthma admissions to hospitals (Burr et al. 1997; Salmond et al. 1999; Roberts et al. 2012).

Deprivation was also seen to be associated with the prevalence rates of asthma (Austin et al. 2004; Basagaña et al. 2004), symptoms and morbidity (Duran-Tauleria et al. 1999; Jordan et al. 2014) and uptake of medications (Kwong et al. 2002). There were also a few studies which did not find any association (Strachan et al. 1994; Austin 2005; Laurent et al. 2008; Gale et al. 2011). The common indices pertinent to the Scottish context studied in relation to asthma are explored in detail in Chapter 4, Section 4.2).

Socioeconomic status (SES) plays a major role in determining health status (Isaacs, 2004). Social factors may be important through their association with causal factors for disease or differences in the quality or amount of medical care. Blanc et al. (2006) noted that SES can be ascertained at the individual level by assessment through questionnaire items that directly quantify personal or family income, items that delineate markers of social status such as education and occupation (which are also

surrogates of economic status), or survey measures that estimate wealth or financial assets. The authors described that SES can also be measured at an "area level", which is the status of the surrounding neighbourhood or community and is often captured through population based surveys, especially census sampling data. Area level SES typically incorporates income measures, education patterns and employment rates, but may also include measures of wealth and deprivation, including average home values and rates of social-assistance provision (Shiue 2013).

Greater severity of asthma in less privileged social classes has been observed to a varying extent in previous surveys done in the United Kingdom by Dawson et al. in 1969 conducting a survey of childhood asthma in Aberdeen and observing the morbidity and school absence caused by asthma and wheezing illness. In the study by Shiue et al. (2013) looking at associated social factors of prevalent asthma in adults and the very old in the UK, it was observed that birth place and education were significant social contributors to risk of adult prevalent asthma throughout the UK. Poverty has other effects on asthma. It contributes to exacerbations, is a determinant of the quality of care that patients receive, and determines the psychosocial behaviour which in turn impacts the management and prognosis of the condition (Sánchez-Borges et al. 2011). These findings tally with the general concepts postulated by Macintyre et al. (1993) and described previously where the authors state that the environmental characteristics in poorer areas are detrimental to health and healthy living where 'deprivation amplification' (a pattern by which a range of resources and facilities which might promote health are less common in poorer areas can play a part (Macintyre 2007)). The next subsection explores further some of the factors contributing to this.

2.4.2.2 Psychosocial Stress, Violence and Asthma

Both physical and social factors can be a source of environmental demands that contribute to the stress experienced by populations living in a particular area (Wright & Subramanian 2007). As discussed earlier in section (2.4.1.7), chronic stress may be a pervasive environmental factor imposed on already vulnerable populations resulting in an enhanced biological response to known physical environmental exposures as noted by Wright et al. (1998)in their review looking at a biophysical approach to understanding chronic stress and asthma. They described that environmental stressors may impact asthma morbidity through neuroimmunological mechanisms which are adversely impacted and/or buffered by social networks, social support, and psychological functioning. Additionally, life stress may impact on health beliefs and behaviours that may affect asthma management.

Similarly, Sandberg et al. (2000) looked at the role of acute and chronic stress in asthma attacks in children in Glasgow, Scotland and concluded that severely negative life events increased the risk of children's asthma attacks and the risk is magnified and brought forward in time if the child's life situation is also characterised by multiple chronic stressors. These findings fall in line with the earlier observations of Evans, (1984) where the author described that exposure to crime, violence, noise etc. not only increased stress but this stress may have the potential to exacerbate hypertension and other stress related disorders which in turn may lead people to engage in smoking and other unhealthy behaviours as strategies of stress reduction. The accumulated effects of stress may also weaken the immune system and increase vulnerability to disease and disability (Geronimus 1991), which can be a cause to consider in the case of people

with asthma also which brings into importance the role of lived spaces; this is described next.

2.4.2.3 Housing Quality and Asthma

Housing quality was described earlier in the previous section on neighbourhood contexts in relation to disease progression (Krieger et al. 2002; Northridge et al. 2003; Evans & Stoddart 2003). In a study by Galea et al. in 2005, among New York City residents, it was described that living in a neighbourhood characterised by poor quality built environment (both internal and external) is associated with greater likelihood of depression even after accounting for individual level socio-demographic factors and neighbourhood level income. More specifically, increased noise levels in the home have been associated with higher perceived stress and increased cortisol levels (Evans et al. 2002), presence of mould, dampness and the inability to keep the house warm have all been associated with both asthma symptoms and distress outcomes (Evans et al. 2000) and housing instability has been associated with both increased allergen levels such as cockroaches and dust and with higher distress symptoms (Sandel et al. 2006; Rauh et al. 2002).

It has been hypothesised that these associations can be explained by lack of control over one's living environment by Suglia et al. (2010) who explored social and environmental stressors in the home for childhood asthma. Sandel et al. (2006) concluded that when one loses the ability to cope or to take control over one's life or environment, one perceives stress. Thus, the home environment can be a direct stressor and in addition may also modify the impact of other stressors on individual health (Elliot 2000). These findings highlight the earlier observation by Blackburn

(1991) that given the large proportion of time spent within the home, housing is both a key environmental influence upon health and a key health resource and it is especially important in relation to a disease like asthma.

2.4.2.4 Summary

Understanding the association between asthma, deprivation present in an area and socioeconomic status are key factors to prevent inequalities and lessen overall disease burden. Another explanation for the socioeconomic differences could be that poor patients are more likely to have poorly controlled asthma possibly because of less recognition of or concern regarding symptoms (Connolly et al. 1989).

Overall, these findings suggest that across all individuals with asthma, living with lower SES is associated with experiencing greater chronic life stress, both at home and the external environment that the individual is exposed to which in turn may directly influence family conflicts, poor quality family relationships and most importantly the burden of disease on the individual which is important when considering place effects on health.

There is evidence that the risk factors associated with asthma, which were outlined earlier, are unevenly distributed across communities and neighbourhoods. Neighbourhood contexts, defined by their characteristics related to socioeconomic disadvantage, physical conditions, and social processes, may play a critical role in accounting for the social disparities in asthma (Wright & Subramanian 2007). Ecological views on health recognise that individual level health risks and behaviours have multilevel determinants, which are in part influenced by the social context within which subjects live (Stokols 1995). Neighbourhood structural disadvantage may

also contribute to the level of socio-physical disorder in the community, including violence which may, in turn, influence asthma (Wright et al. 2004; Wright et al.2006) thus making social contexts an integral and important factor to look into when understanding asthma and place effects.

Given its prominence in the literature and its undoubted importance, it is essential to study in greater detail the relationship between measures of deprivation and asthma prevalence which is undertaken in Chapter 4. And further, although it is known that there are many and complex social factors which shape asthma, there is a research gap – we know very little, if anything, about the ways in which health practitioners understand and respond to these social factors which is explored in Chapter 5.There is also a need for further research on the perceptions of people with asthma in local areas.

The next section explores the management aspects in relation to asthma from the patient and organisation level and would build into the wider environmental context of asthma concluding this literature review.

2.4.3 The Factors Influencing the Management of Asthma

This section describes the results from the review that looked at the factors influencing the management of asthma at the healthcare and patient level. This review adds another layer to the evidence gathered to understand the different contexts in which asthma presents itself. First, an insight into the methods and guidelines adopted to treat asthma over the years are described as this will help to understand the management initiatives undertaken to treat the disease. Then the factors that influence management from the context of the patients and healthcare

system are highlighted and described. The review concludes with a discussion of the main points that emerged out identifying one of the research gaps existing i.e. understanding the perceptions of health practitioners of local social contexts and how they respond in terms of asthma management which is the focus of this research and sets up for the next stage of analysis.

2.4.3.1 Understanding the management initiatives over time

Asthma is a chronic inflammatory disorder of the airways. By the late 19th century, asthma was being described by health practitioners as a disease corresponding to four overlapping paradigms – a primary disorder of the lungs, an allergic condition, a disease associated with environmental irritants and a disease linked to emotional stress. Each perspective gave insights into the mechanism of asthma and the clinical approach to managing the disease (Sakula 1988) which emphasises the ongoing complexity in asthma causation and treatment/management of the disease.

The modern view of medical professionals if of eight paradigms – bronchoconstrictor, nervous system, allergy, mediator, the inflammatory, the TH2-style inflammatory, the innate immune and the genetic paradigm (Walter & Holtzman 2005). However, without a breakthrough in how to cure this complex disease, current scientific and clinical thinking has recognised that asthma control requires a combination of medication, reduction in environmental exposures and improvement in patient coping skills (British Thoracic Society 2009; Global Initiative for Asthma 2012). Perhaps, given its complexity, a 'cure' will never be possible, only improved clinical and behavioural responses can be moderated. In susceptible individuals with asthma (genetic, physiological, lifestyle) or a combination), inflammatory symptoms are

usually associated with widespread but variable airflow obstruction and an increase in airway response to a variety of stimuli. Obstruction is often reversible, either spontaneously or with treatment (National Institue of Health 1992).

2.4.3.2 Adapting to guidelines: The real picture

Evidence based guidelines have been constructed and published to support primary care health professionals to manage asthma (British Thoracic Society, 2012; National Institute of Health, 2007). The British Thoracic Society/ Scottish Intercollegiate Guideline Network (BTS/SIGN) devised the British Guidelines on the management of asthma recognising the chronic nature of the disease process. It gave information for controlling symptoms by use of preventative medications like glucocorticosteroids which control the disease by suppressing symptoms as well as reducing inflammation during acute attacks. This would help the patient to carry out their normal daily activities, achieve optimum quality of life and have minimal risks from future adverse events. To manage this process, the patient needs to be reviewed and their asthma assessed periodically (British Thoracic Society 2009). So, effective management has to be a partnership between the individual and clinician.

Asthma management guidelines can be a potentially powerful tool for reducing or eliminating disparities in asthma due to such things as race, ethnicity or social deprivation (Cabana et al. 2002) as it is a common chronic disease seen in the population. Practice implementation of the guideline recommendations can therefore be influential for improving the organisation and ultimately the outcome of asthma but despite their availability, there continues to be a significant gap between what is considered optimal care and actual current practice (Finkelstein et al. 2002; Lozano et

al. 2003; Wiener-Ogilvie. 2007). So, issues like social deprivation can also constrain the effectiveness of guideline-led asthma management.

It can be challenging to primary care health professionals who must manage this complex condition along with trying to achieve the standard of care outlined by the guideline recommendations. As of now there is no "Gold Standard "in the treatment of asthma with different guidelines issued in different countries and the uncertainty over the best way to monitor and assess control in the clinical setting (Reddel et al. 2009). The goal of any asthma guideline is to minimise symptoms and maintain control using the lowest possible amount of drug medication combining with increased patient knowledge, avoidance of triggers and ability to self-manage the disease. The management cycle will involve assessing, treating and monitoring asthma control in each individual (Hoskins et al 2012). This is quite a challenging set of standards to try and achieve as the many factors which influence both patient behaviour and clinician practice will need to be taken into consideration.

It is possible for patients with asthma to achieve total control as an achievable goal (Bateman et al. 2004) but health professionals must balance this with the potential risk of adverse effects from treatment (British Thoracic Society 2009) and a patient's own goals for their asthma (Caress et al. 2005; Steven et al. 2002). Thus, this is helped by the publication of guidelines, better use of preventative medication, the introduction of nurse-run asthma clinics which have had a significant role to play in the decrease in urgent GP consultations and hospital admission (Griffiths et al. 2004), (British Thoracic Society 2009) and empowering patients with the ability to self-manage their condition with the provision of asthma action plans which is described

in detail next.

2.4.3.3 The role of self-management in Asthma

Self-management forms a part in the wider management of asthma empowering the individual to take care of his or her own condition. There is no "gold standard," universally accepted definition of self-management (McGowan 2005) but the scope of self-management is broad and researchers have defined self-management to be inclusive of a variety of factors.

The simplest definition, put forth by (Creer et al. 1976), for self-management is "when the individual participates in treatment".
Nakagawa-Kogan et al. (1988) defined self-management as "a treatment that combines biological, psychological and social intervention techniques, with a goal of maximal functioning of regulatory processes".

In more simple terms, Redman (2004) defined self-management preparation as referring to "the training that people with chronic health conditions need to be able to deal with taking medicine and maintaining therapeutic regimes, maintaining everyday life such as employment and family, and dealing with the future, including changing life plans and the frustration, anger, and depression".

Lorig (2003) defined self-management as "learning and practicing skills necessary to carry on an active and emotionally satisfying life in the face of a chronic condition" Lorig further emphasised that self-management is not an alternative to medical care but rather self-management is "aimed at helping the participant become an active, not

adversarial, partner with health care providers".

Asthma self-management is promoted with the provision of action plans. An asthma action plan (Fig 2.2) is a treatment guide that a patient can follow easily with instructions prescribed by a healthcare provider. It helps to teach patients to take appropriate medications and adjust them accordingly as their asthma conditions change in order to keep their asthma under control.

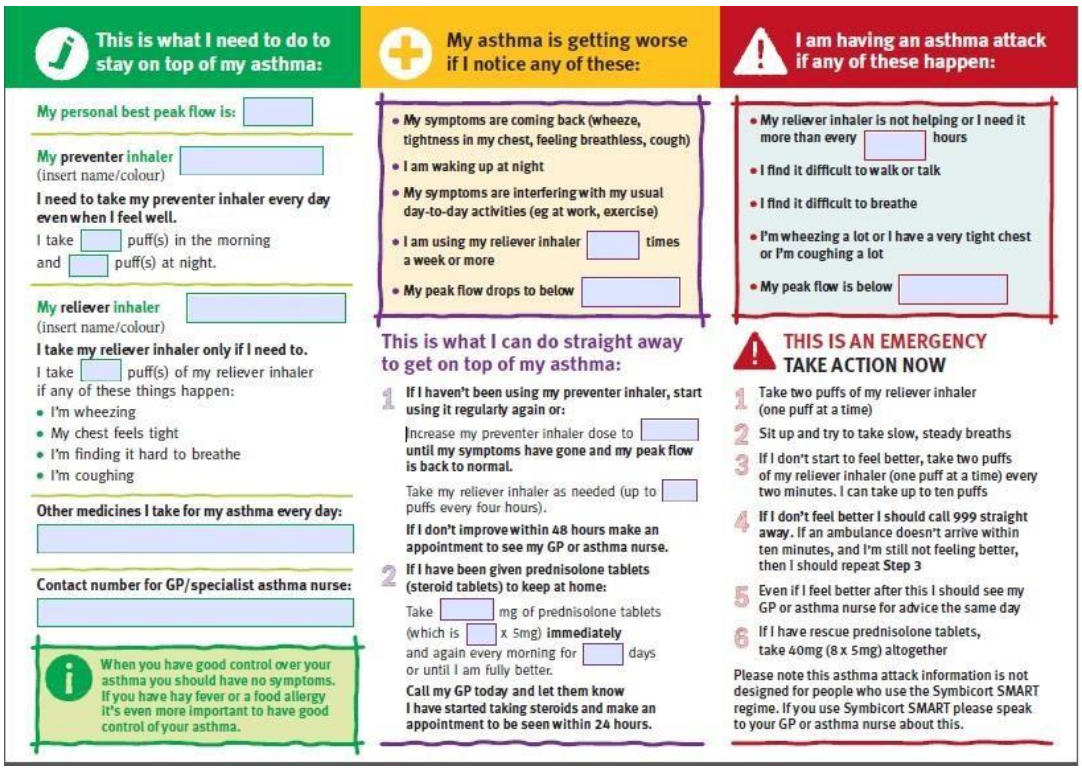
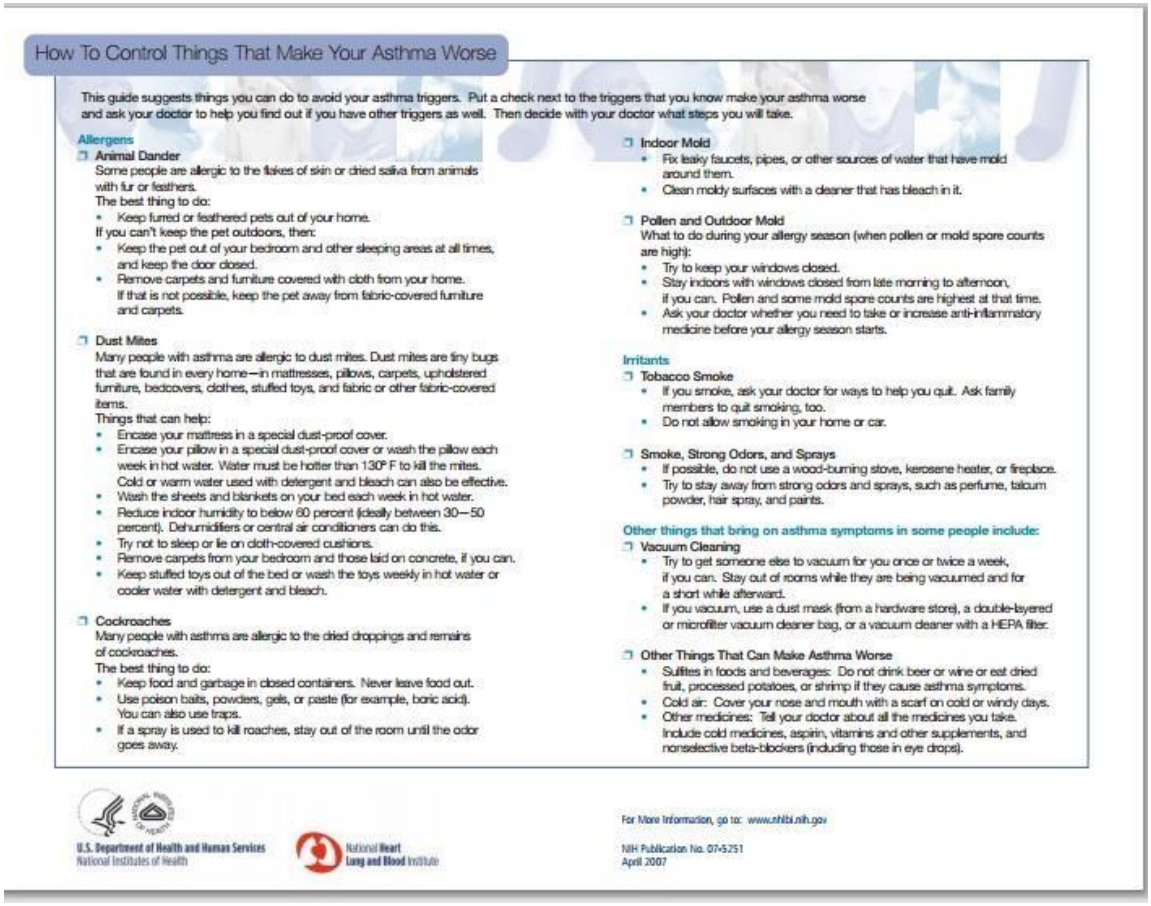


Fig 2.2 An example of an Asthma UK Asthma Action Plan which is widely used in General Practices in the UK

An asthma action plan outlines what medication to take every day even if the patient is feeling better, how to understand if their asthma is getting worse, what should be done if the symptoms are getting worse and what to do if the patient is having asthma attack. Some action plans can also provide information on avoidance of triggers as shown in Fig 2.3 by the US National Institute of Health asthma action plan.



How To Control Things That Make Your Asthma Worse

This guide suggests things you can do to avoid your asthma triggers. Put a check next to the triggers that you know make your asthma worse and ask your doctor to help you find out if you have other triggers as well. Then decide with your doctor what steps you will take.

Allergens

Animal Dander

Some people are allergic to the flakes of skin or dried saliva from animals with fur or feathers.

The best thing to do:

- Keep furred or feathered pets out of your home.

If you can't keep the pet outdoors, then:

- Keep the pet out of your bedroom and other sleeping areas at all times, and keep the door closed.
- Remove carpets and furniture covered with cloth from your home. If that is not possible, keep the pet away from fabric-covered furniture and carpets.

Dust Mites

Many people with asthma are allergic to dust mites. Dust mites are tiny bugs that are found in every home—in mattresses, pillows, carpets, upholstered furniture, bedcovers, clothes, stuffed toys, and fabric or other fabric-covered items.

Things that can help:

- Encase your mattress in a special dust-proof cover.
- Encase your pillow in a special dust-proof cover or wash the pillow each week in hot water. Water must be hotter than 130° F to kill the mites. Cold or warm water used with detergent and bleach can also be effective.
- Wash the sheets and blankets on your bed each week in hot water.
- Reduce indoor humidity to below 60 percent (ideally between 30—50 percent). Dehumidifiers or central air conditioners can do this.
- Try not to sleep or lie on cloth-covered cushions.
- Remove carpets from your bedroom and those laid on concrete, if you can.
- Keep stuffed toys out of the bed or wash the toys weekly in hot water or cooler water with detergent and bleach.

Cockroaches

Many people with asthma are allergic to the dried droppings and remains of cockroaches.

The best thing to do:

- Keep food and garbage in closed containers. Never leave food out.
- Use poison baits, powders, gels, or paste (for example, boric acid). You can also use traps.
- If a spray is used to kill roaches, stay out of the room until the odor goes away.

Indoor Mold

- Fix leaky faucets, pipes, or other sources of water that have mold around them.
- Clean moldy surfaces with a cleaner that has bleach in it.

Pollen and Outdoor Mold

What to do during your allergy season (when pollen or mold spore counts are high):

- Try to keep your windows closed.
- Stay indoors with windows closed from late morning to afternoon, if you can. Pollen and some mold spore counts are highest at that time.
- Ask your doctor whether you need to take or increase anti-inflammatory medicine before your allergy season starts.

Irritants

Tobacco Smoke

- If you smoke, ask your doctor for ways to help you quit. Ask family members to quit smoking, too.
- Do not allow smoking in your home or car.

Smoke, Strong Odors, and Sprays

- If possible, do not use a wood-burning stove, kerosene heater, or fireplace.
- Try to stay away from strong odors and sprays, such as perfume, talcum powder, hair spray, and paints.

Other things that bring on asthma symptoms in some people include:

Vacuum Cleaning

- Try to get someone else to vacuum for you once or twice a week, if you can. Stay out of rooms while they are being vacuumed and for a short while afterward.
- If you vacuum, use a dust mask (from a hardware store), a double-layered or microfilter vacuum cleaner bag, or a vacuum cleaner with a HEPA filter.

Other Things That Can Make Asthma Worse

- Sulfites in foods and beverages: Do not drink beer or wine or eat dried fruit, processed potatoes, or shrimp if they cause asthma symptoms.
- Cold air: Cover your nose and mouth with a scarf on cold or windy days.
- Other medicines: Tell your doctor about all the medicines you take. Include cold medicines, aspirin, vitamins and other supplements, and nonselective beta-blockers (including those in eye drops).

U.S. Department of Health and Human Services
National Institutes of Health

National Heart Lung and Blood Institute

For More Information, go to: www.nhlbi.nih.gov

NIH Publication No. 07-5251
April 2007

Fig 2.3 National Institute of Health Asthma Action Plan Information on Triggers

Actions plans can be given in the written format or orally depending on what seems appropriate as decided by the health practitioner. Written action plans are linked to improved patient outcome and if used can facilitate improved patient self-management of asthma (Gibson et al. 2003). The benefits of symptom based action plans have been highlighted in a number of studies and there has been a plethora of evidence to support their use in primary care (Beasley et al. 1989; Charlton et al. 1990; G Hoskins et al. 1996; Glasgow et al. 2003; Gibson, 2004; Wolf et al. 2008).

Patients who use an action plan can reduce their hospital admissions and urgent consultations with a GP, experience fewer 'days off ' due to asthma symptoms and suffer less night time symptoms (Caress et al. 2002). Linking action plan use and self-

management education with regular review empowers patients to take control of their own asthma, increasing their confidence and better adherence with medication (Robertson et al., 1997).

The provision of a plan supported by how and when to use it negotiated with the patient by skilled professionals, is therefore a fundamental part of an asthma review consultation (Gibson 2004; Wolf et al. 2008). Cochrane systematic reviews of randomised controlled trials of asthma action plans utilisation means that they are recommended as good practice in asthma care (Global Initiative for Asthma, 2012; British Thoracic Society, 2012a) and are an integral part of health policy in many countries throughout the world (Department of Health, 2002; NHS Scotland, 2005; WHO, 2005; National Institue of Health, 2010; Department of Health and Ageing, Australian Government, 2005).

However, despite the evidence and availability of guidance about constituent parts of care plans (Gibson, 2004a), underutilisation of these plans are seen in health professionals (Hoskins et al. 2005; Wiener-Ogilvie et al. 2008), under use of plans by patients (Gibson, 2004; Wiener-Ogilvie et al. 2007; Tse et al. 1991) and failure to update the plans on a regular basis when given to the patient (Barton et al. 2005). These are some of the barriers that exist for proper self-management of asthma in a patient.

Other barriers that exist in asthma self-management and that would relate to place contexts are inadequate literacy among patients (Williams et al. 1998), health behaviours and beliefs like smoking, diet etc. which shape the success of management of a disease (King et al. 2003). Depression, weight problems, difficulty exercising,

fatigue, poor physician communication, low family support, pain, and financial problems were the most frequently noted barriers to active self-management as found in a study by Jerant et al. (2005). In a systematic review by Newman et al.(2004) looking at self-management interventions for chronic illnesses, behaviour change in patients with asthma was noticed in 57 % of the studies that were looked into that targeted some aspect of behaviour, usually adherence to preventive medications, recognition and appropriate use of rescue medications as well as inhaler technique, self-monitoring, and avoidance of asthma triggers some of which used an education and action-plan approach.

Thus self-management is a wider trend in the "individualisation" of healthcare, which is partly due to a rise in chronic illnesses and the additional demands placed on healthcare services. It also empowers people how to look after themselves to enhance their wellbeing (Nettleton 2006). Thus it can be seen that recommended asthma management techniques (including self-management plans) do not take into account complex local social factors, and further there has not been sufficient research into how health professionals understand and try and put into practice asthma management which is explored in detail in Chapter 5. The next section explores the practice factors influencing the management of asthma.

2.4.3.4 Practice factors influencing the management of Asthma

The majority of people with asthma in the United Kingdom are treated in primary care (Neville et al. 2003). The management of asthma is predominantly a primary care responsibility. The quality of primary care management is therefore central to improving asthma outcome with General practitioners and Practice nurses playing a

vital role in increasing the awareness, diagnosis and effective management of asthma. However, despite exemplars of good care, the overall standard of primary care service for people with asthma remains inconsistent, resulting in the level of asthma control falling short of expected targets especially in Europe (Rabe et al.2000). In an audit conducted by Horn et al. (1989) in the management of asthma in two large general practices in the UK, the results showed that many patients received sub optimal therapy and were under treated.

In another observational study by (Campbell et al. 2001) identifying predictors of high quality care in English General Practices for asthma, diabetes and angina, the results revealed that longer consultation times are essential for providing high quality clinical care. The authors also noted that good teamwork was a key part in providing high quality care across a range of areas and may need specific support if quality of care was to be improved. Most importantly, additional support was needed to provide preventive care to deprived populations which may be a factor to consider if regular clinical care was to be provided to patients from these areas.

2.4.3.5 Asthma Reviews

Having regular reviews with patients with asthma was not the norm until 1990 in the UK except perhaps by 'asthma interested' general practitioners (Hoskins et al. 2012). However, the introduction of incentive payments for establishing chronic disease management clinics due to the 'new' UK GMS contract in 1990 (Department of Health and the Welsh Office 1989), encouraged the widespread introduction of chronic disease management clinics for common long term conditions of which asthma was one.Then onwards, guidelines for the management of asthma have consistently

recommended that patients with asthma should be reviewed regularly in accordance with the severity of their disease and in line with their needs both by international and national guidelines for best practice.

A newer contract for general medical services delivered by general practices was introduced in the UK in April 2004. A Quality and Outcomes Framework (QOF) was an integral part of the new contract and rewarded practices for delivering more evidence-based care. This marked a fundamental shift in the way general practice was resourced with a mixture of capitation, fee for service and performance-related pay. Implementation of the UK Quality Outcomes Framework provides practices with an incentive to improve organisation and management of asthma (NHS Confederation 2003). To achieve points, practices have to compile a disease register and review 70% of their patients with asthma within a 15 month period. The quality indicators for asthma were informed by the BTS /SIGN asthma guideline (British Thoracic Society 2012b; Health and Social Care Information Center 2013).

Good practice organisation, specifically longer consultations and seeing the same clinician is linked with an increase in participatory care (Adams et al. 2001). Consultation style and the quality of provider- patient communication can impact on patient satisfaction and health related outcome (Adams et al. 2001; Stewart, 1995). There is also growing evidence that variations in asthma care and outcome may stem from differences in the way in which GPs and other primary care team members define, measure and monitor control in their patients with asthma (Partridge et al. 2006; Chapman et al. 2008 ; Østrem, 2008 ; Boulet et al.2002; Bateman et al.2007). Variations in asthma care also reflect broader inequalities in healthcare provision, access and utilisation.

Goeman et al. (2005) conducted a qualitative study among Australian General Practitioners exploring the barriers in delivering asthma care from the healthcare personnel perspective. The findings revealed that there was unanimous consensus among them, nominating asthma education for patients and continuing professional education for GPs as major priorities. Other priorities identified to improve management were adherence to medication, facilitating regular patient review, negotiated treatment/management plans, making the correct diagnosis, increased remuneration and consultation time, and safer asthma medications and access to these. In addition, health promotion initiatives and increased public awareness were also priorities. Interestingly, written asthma action plans were not considered a high priority and such written plans form a part of self-management in asthma explored in this study (Chapter 5, Section 5.3.4).The next section explores the patient factors influencing the management of asthma.

2.4.3.6 Patient factors influencing the management of Asthma

Remembering to take or give medications on a daily basis is for many patients and carers, the most difficult aspect in asthma management (Peterson-Sweeney et al., 2003). The individual nature of asthma means that patients 'know' their own asthma better than anyone else (Sweeney et al. 2001). For many patients with mild symptoms asthma is a condition they can and do largely ignore, depending on the occasional puff of their bronchodialator inhaler (Haughney et al. 2004; Partridge et al. 2006; Paterson et al. 2000). The longer people live with the condition, the more likely they are to develop coping strategies that may mean they either disregard poor control or become less sensitive to the presence of symptoms (Haughney et al. 2004; Goeman et al. 2007).

Patient recognition of personal triggers is an important aspect of management (British Thoracic Society, 2012a). The most common triggers that patients associate with their asthma are psychological triggers, allergens like pollen, house dust mite, animal dander, air pollution, infection and physical activity (Ritz et al., 2006).

In a population based study exploring psychological factors and asthma quality of life by Adams et al. (2004), the results indicated that psychological distress and decreased feelings of control are common in asthma and are significantly associated with physical health status. Poor understanding and identification of symptoms, beliefs about the consequence of symptoms or their ability to do anything about them and a failure of others to notice and/ or tell them about a deterioration in symptoms, are all detrimental to the outcome of their asthma. Bender (2012) noted that the relationship between depression and asthma may involve more than one causal pathway and includes the possibility that depression can lead to a sense of hopelessness that erodes adherence and other health-promoting behaviour. This may impact on their medication intake which is discussed next.

2.4.3.7 Non–adherence

Non-adherence to prescribed asthma medication is a major factor affecting the management of asthma and the reasons for patient non-adherence are multi- faceted. In a study conducted by Finkelstein et al. (2002), the results showed that the underuse of controller medication was factor contributing to medication non-adherence. Molimard et al. (2008) highlighted that patient related factors including smoking, poor compliance and critical errors in device manipulation, have significant negative impact on asthma control. This could be addressed by patient education. Bosley et al.

(1995) indicated that non- adherence is associated with a complex mix of psychosocial factors, social context and place factors.

The national and international guidelines have provided clear step wise recommendations on the acute and chronic drug treatment of asthma (British Thoracic Society, 2012a; Global Initiative for Asthma, 2012) but despite these, patients continue to underuse preventer medications and overuse reliever medications (Lozano et al. 2003; Bosley et al. 1995). In an Australian study on factors affecting adherence to asthma treatment in an international cohort of young and middle-aged adults by Corsico et al. (2007), showed that adherence to asthma treatment remained low worldwide although it significantly increased in Europe and the major predictors of increased or persistent adherence were due to the regular follow up consultations with health care professionals and having positive beliefs about the medication. They concluded that further improvement in asthma management could be achieved through an improvement in the quality of clinical communication because non-adherence to medications still remains a major healthcare problem across countries. But clearly this factor can also be missed out by practitioners as highlighted in a study reviewing medication non adherence where it was found out that the ability of physicians to recognise non adherence was poor (Osterberg et al. 2005).

It may be also interesting to note that "adherence" could be the flip side of responsibility where the situation maybe that the more responsibility an individual is given to control their asthma, there is a greater likelihood that their degree of adherence will vary depending on the individual, social contexts and their inclination to impart proper medication which is reflected in inhaler techniques which is discussed next.

2.4.3.8 Inhaler Technique

Proper inhaler technique among patients and ability to impart the right technique education from the health care practitioner is essential for a successful management in asthma. There is evidence of the association between inhaler technique and inadequate medication use (Duerden et al. 2001). Without the provision of inhaler devices that a patient can use effectively combined with a practical demonstration, regular reassessment of inhaler technique and verbal and written education, poor inhaler technique will also continue to be significant factors in asthma management. This brings into focus the way inhaler education from the health practitioner may have impacted the patient and the support mechanisms between patients and practitioner is described next.

2.4.3.9 Patient –Practitioner support

Many patients lack the confidence as well as the practical skills to manage their condition (Moosa et al.1997; Kieckhefer, 2000) and must depend on health professionals for support and guidance. Health professionals must be aware that patients use different terms to describe their asthma and this can impact the management of asthma (Aroni et al. 2004 ; Vincent et al. 2006).

For patients prepared to work in partnership with their health care professional, good asthma control is achievable (Global Initiative for Asthma, 2012; Bateman et al. 2004; British Thoracic Society, 2012a; Gibson et al. 2003). To ensure that optimal treatment is received at all times, an understanding of the factors both from the health professional providing the care and from the patient who will have to manage their asthma by responding immediately to changes will be needed. This thesis research addresses the

first of these from the perspectives of the health professionals in the case study results in Chapter 5 and further future research will study patients perspectives.

This will augur well with the recent initiatives to see the changed nature of patient-practitioner relationships where the ideal situation will be a "partnership" (Nettleton 2006) but the inherent problems will need to be identified and looked into based on the contexts in which the place and the nature of individuals with asthma is present in the area which is explained briefly next.

2.4.3.10 Healthcare Disparities in asthma care

Disparities that exist in health care and the environment for inner-city children with asthma are further affected by disparities in social settings (Bryant-Stephens 2009). In addition to poor housing, caregivers of children with asthma are often faced with disparities in neighbourhoods with fewer supportive and essential resources and related chronic stressor (Rivers et al. 2006). Many times, families are entrapped by lack of opportunities, services, and institutions that are needed for a family to succeed.

High crime rates in disadvantaged neighbourhoods can mean that people are afraid to leave their homes. This would interfere with patients and caregivers confidence and their ability to access safe transportation to a medical facility when needed, as events like health emergencies require immediate medical care, sometimes at night. The prevailing violence that maybe present in the neighbourhoods can lead to social and geographic isolation, which become important barriers in delivering good health care (Bryant-Stephens, 2009). Lack of access to transportation affects caregiver and patient compliance with clinic/hospital visits, travel to pharmacies and therefore asthma management. If there is a lack of resources to sustain adequate housing, it can also

interfere with adherence to both medical and environmental interventions prescribed, essential components of asthma management (Mitchell et al. 2005) which relate back to place contexts and health described earlier.

2.4.3.11 Summary

This review has given an overview of the various initiatives undertaken in the management of asthma and what factors influence the management of asthma at the health care and patient level. At the health care level, the absence of a robust "Gold standard" guideline in the management of asthma gives an insight into the complexity of managing the disease especially if there was a lack of support existing between the practitioner and patient. Studies have shown the advantages of asthma action plans, but how beneficial they are depends on the active role in adopting these plans by the practitioner prescribing and reviewing it and the patient.

The patient factors influencing asthma control are wide ranging and vary from individual to individual often influenced by factors like personal characteristics, the physical and social environment they live in or the way they get along with their treatment plan. But these patients need to be supported in managing their condition within the primary care setting. The success of asthma management and treatment will be influenced by the organisation within which the clinician and primary health care professional functions.

The complexity and the many causes of asthma as a condition make it very challenging to manage, for both patients and health practitioners. It is clear from the literature review evidence that the scale of the General Practice and the local area is where asthma management happens. The attitudes and actions of the GP and practice

nurse, and their perceptions of patients and relationships with patients, must be central to research to explore and get better insights especially in Scotland where asthma is a significant problem for primary care due to the high prevalence of asthma.

2.5 Conclusion

Though asthma is a clinical condition where a lot of focus primarily has been to improve clinical outcomes, this review sought to understand how place contexts could be incorporated into health research giving insights to the importance of how place factors ranging from the socio-environmental triggers to disease management approaches build into the context for a complex disease like asthma.

What emerged out from the primary reviews on health and place was the recognition of the role of location beyond purely geographical determinants as it previously used to be understood. It became apparent that when looking at disease, disability or chronic illness, there were a whole range of life situations within the world in which people lived and this shaped their health behaviours. That fact came out strongly.

Traditional Public Health approaches looked at disease prevention and mitigation at the community level but not at the individual level. This gave a very superficial understanding of the linkages of the causative factors at the aggregate level for a group of population (E.g. exposure to pollution, uniformity of place, uniformity of the assumption of the relationships between the environmental factors and their impact on these group of individuals), while in reality it emerged that there was huge heterogeneity and diversity, among and between people but also, between places and contexts.

The shift in focus of medical Geography and to an extent Public Health, from investigating disease determinants to incorporate a social turn which recognised the importance of 'place' is important. It was easier to understand the complexity surrounding common chronic diseases like cardiovascular disease which was linked to social class whether the individual worked as a manager or manual worker and showed heart disease did not affect everyone in the same way. There was something bigger than the individual going on but at the same time it still isolated people from their context. Recognising the importance of the area of residence, social relationships and the environment are an important aspect in these chronic illnesses.

Initially, Public Health for instance looked at the notion of smoking rates or typical risk factors for cardio vascular disease but a shift was seen to recognise the importance of other causative factors. It was not just identifying who smokes and who doesn't. It was more complex as other risk factors had to be brought in such as behavioural, environmental and social risk factors which built into the complex picture for cardiovascular disease. The shift in understanding how long term conditions have come about is important as asthma has not received the same attention even though it is similar in disease burden to common chronic illnesses. When place effects come into prominence, the evidence from the literature review shows how a complex disease like asthma is affected.

Public Health draws on geographical information to understand place effects. Other disciplines have also made transitions like Psychology from understanding behaviours to acknowledge that it is not the physicality of the environment that changes behaviour but rather the emotional, perceptual experience and quality that shapes

behaviour. So taking a step back, it is pertinent to understand that there are other fields working in tandem alongside Public Health and Geography in understanding place effects on health.

The notion of managing key conditions is better now as there is a shift of focus to lifestyle related and preventable diseases. The new Public Health understands confronting these complexities and managing complex long term conditions with complex aetiologies at multiple levels and using non-traditional health disciplines to understand these new factors. The linearity and simplicity of place condition relationships has to be replaced by a complex, non-linear view that reflects the dynamics within socio-geographical locales and the situationally variable factors of a complex health condition such as asthma (e.g. at the person, system, support etc. level).Thus, it would be advantageous to utilise methods from an interdisciplinary area of investigative research.

Looking at place effects on health, Macintyre et al. (1993) pointed out the ecological fallacy in assuming what is found at the aggregate level doesn't necessarily play out at the individual level. The dichotomy of context and composition meant that risk factors had to be understood at the individual and contextual levels and it was necessary to articulate these nested relationships.

Gesler & Kearns (2005) pointed out that identifying or not identifying a sense of connection to where you live can have a real impact on the person. So if a person is living in an area that he identifies with, values and is a good place to live, that can have positive effects on their health behaviours and stress levels. The reverse is that if the person lives in a place that has low value or perceived by other people, media,

presence of negative vibes etc. that can make the person have feel low in self-esteem, value and so the identity associated by an individual with a place is important. Evidence from the literature showed how social stressors work in neighbourhood context and for a disease like asthma it is important to acknowledge these aspects too. The dominant policy and practice around asthma is individually focussed especially in its clinical management as seen by the guidelines issued (British Thoracic Society 2012b). The focus is pretty much on the individual, their health condition and in its clinical management.

The General Practitioner or Practice Nurse prescribes medicines, gives instructions on inhaler technique, and advises on smoking behaviours and use of self-management plans. But what was seen from the literature review was that a whole range of evidences built up particularly socioenvironmental factors like poverty, stress and exposure to physical environmental stressors. Perhaps the health practitioner knows in the back of their mind some of the triggers for worsening asthma maybe probably due to the socio-environmental factors but their thinking maybe very individually based and not at the broader population scale. These factors have been less considered when looking at management strategies in the clinical guidelines and it is really important to think about these contextual factors too as the dominant clinical thinking and asthma management guidelines, remain individual-focused.

The literature review responding to Research Question 1 in this thesis looked at the current evidence of the relationship between the socio-environmental factors and asthma outcomes. Asthma is still largely seen as a clinical condition although environmental and social triggers have been identified in the causation of asthma. The

management of asthma continues to be focused on symptom identification, monitoring and intervention, largely irrespective of understanding the living; and broader social and physical environments that individuals with asthma are exposed to.

Initial understandings of place influences on health and illness, especially in the area of Public Health but also to a degree in quantitative Geography assumed simple linear quantifiable relationships between factors such as social deprivation and asthma prevalence. Was this relationship more complex? The contribution of this chapter to the overall thesis was to show the importance of integrating place contexts in relation to asthma research gave insights into asthma-place contextual factors ranging from the socio-environmental triggers to disease management approaches that built into the context for a complex disease like asthma.

There is little understanding of the way that health practitioners understand asthma in relation to its management. It is necessary to understand how place factors along with person factors are implicated in the successful management of asthma as a long-term condition in Scotland. This research will look into this aspect first by exploring the asthma–place contexts relationship in relation to deprivation in the Scottish context in the chapter 4. The next chapter describes the methodological approaches adopted that provided a framework for data exploration, integration, analysis and interpretation in this thesis.

Chapter Three

Methodology

3.1 Introduction

The literature review in the previous chapter was undertaken to explore the connections/linkages between the socio-environmental context and health with a particular emphasis on asthma and the healthcare responses to asthma management. Starting at a broader scale, the review looked into the role played by "health and place" contexts in shaping health in general and narrowed down specifically to understand how the different factors that formed a part of this context had the potential to shape the prevalence and management of asthma. The review helped to identify the most common socio-environmental factor studied upon i.e. deprivation, highlight the importance of asthma-place relationships in the context of this research responding to Research Question 1 in this thesis. The contribution of the previous chapter to the overall thesis was to show the importance of integrating place contexts in relation to asthma research gave insights into asthma-place contextual factors ranging from the socio-environmental triggers to disease management approaches that built into the context for a complex disease like asthma.

The purpose of this chapter is to describe the methodological approaches adopted that provided a framework for data exploration, integration, analysis and interpretation in this thesis. This section begins at the theory level with a detailed description of the ontological and epistemological perspectives that provided the rationale for the methods adopted. This is followed by a description of the methodological context that

directed the research explaining the importance of integrating an interdisciplinary approach at the intersection of social (e.g. Geography) and applied health sciences (e.g. Public health) and adopting multiple methods to gather and analyse the data for this thesis. A detailed description of the methods employed and how it would be interpreted in this thesis concludes the chapter. The contribution of this Chapter to the overall thesis is to recognise the importance of a multi-disciplinary approach to the study of asthma (to capture the multiple factors that shape asthma prevalence and management).

3.2 Theoretical Background and Framework

Designing a research methodology which is able to capture how the context of the environment shapes asthma prevalence and management requires careful planning as it is challenging and complex. The nature of asthma is such that multiple factors like environmental triggers (Ozone, dust mites, air pollution), social factors (smoking, stress) or individual factors (genetic predisposition) influence a person's condition individually or in combination at different instances. Health inequalities is a major factor present in Scotland (Audit Scotland 2012) and exploring the different contexts an individual with asthma is exposed to was important.

The subsequent discussion of ontological and epistemological orientation in the next sections positions the research presented in this thesis in a realist and pragmatist tradition. Adopting an ontological and epistemological perspective was essential to proceed with the methodology selected since this research was adopting methods from an interdisciplinary perspective.

3.3 Ontology

Various ontological perspectives exist in the realm of social sciences. A Positivist perspective explains that the world is objective and independent of our subjective experience. It explains that the world is knowable, and this knowledge is communicable between agents (Gray 2013). An Interpretive ontological perspective elaborates that the world is dependent on the many subjective experiences of that world, and does not exist independently of experience. There is no possibility of 'objective' knowledge of the world and all we have are different experiences (Scotland 2012). Empiricism postulates that we can observe the world and evaluate those observations in relation to facts (Sellars 1956). Post positivism explains that there is an objective world, but knowledge of it is filtered through the subjective experience of individuals. This knowledge is by its nature partial and bound by individual experiences (Trochim 2006). Realism accounts that that there are facts out there waiting to be discovered (Creswell 2003).

This research borrows from a Critical Realist philosophy of science perspective which assumes that reality is composed of different levels (e.g. the biological, the psychological, the social, and the cultural level) which is relevant to a multi factorial disease like asthma. None of these levels, nor the causes of what occurs on these levels, can be reduced to another level. This can be a cornerstone for any analysis and implies that complex social phenomena, such as information need, seeking and use, cannot be explained in terms of mechanisms or processes working at just one level, be it personal, cognitive, discursive or socio-cultural but works in multiple levels (Wikgren 2005).

Thus, Critical Realism underpins that what we see in this world is dependent on what our mind perceives it to be and we also understand that there are other things happening that are independent of what our mind perceives it to be. Critical realism recognises the fact there is the world and all that goes in it but we can know only a part of that. It recognises that it is not possible for us to know everything and we can only see what is in front of us. And what we see in front us is only through a particular lens.

As an example, an individual with asthma can be influenced by different factors interacting within a variety of environments, the ontological stance of Critical realism highlights that this is different from the actual reality. There exists a reality that is independent of its human conception. Unobservable events happening in the background cause the observable ones and the reality can only be understood if the structures that generate these unobservable events are understood. This helps in distinguishing the event and the structures what causes it.

The critical side of this theory arises from the identification of epistemic fallacy – the idea of analysing ontological statements in terms of epistemological statements. Epistemic fallacy is caused by a failure to recognise a difference between ontology and epistemology (Archer 1998). The realism side of the theory helps to focus on the existence of real mechanisms which shape events for explanatory benefits and this requires a deep understanding of any situation going beyond the observable and investigating the mechanisms behind the event. Thus, this theory helps in explaining complex events or contexts of asthma ruling out any other potential explanations.

3.4 Epistemology

This study adopted pragmatism as an epistemological basis to explore the context of the environment that had the potential to shape asthma prevalence and management at General practices in Scotland. Pragmatism interprets knowledge claims arising out of actions, situations and consequences rather than antecedent conditions.

Creswell (2003) points out that the advantage of utlising pragmatism is that it is not committed to any one system of philosophy and reality. To understand the context of the environment and its relation to asthma, the researcher has a freedom of choice to choose the methods, techniques, and procedures of research that best meet the needs and purposes. Creswell contends pragmatists do not see the world as an absolute unity. Interestingly, asthma as a disease is unique in a way that it can be studied utilising multiple methods and look to many approaches for collecting and analysing data rather than subscribing to only one way (e.g. quantitative or qualitative). Thus multiple methods provide researchers with a variety of data collection methods as they work to provide the best understanding of a research problem. Pragmatism opens the door to multiple methods, different worldviews, and different assumptions, as well as to different forms of data collection and analysis.

3.5 Interdisciplinarity and Multiple Methods

The advantage of interdisciplinary research is that it is possible to approach complex problems, employing data integration, general assumptions, techniques and methods from different disciplines (Danermark 2001). This helps in the combination of knowledge from different disciplines, thus providing a scope for deeper knowledge

and new explanatory models often leading to generate new approaches and methods which will be helpful looking at the complex context asthma presents.

In contrast to natural and medical sciences, social sciences do not seek to limit experience to the conditions of systematic observation, the requirements of measurement, but rather to open boundaries of the experiences that maybe inquired into (Walker 1995). Within some of the social sciences, qualitative methods maybe employed more commonly than in the medical sciences (Devers 1999).

It can be advantageous to focus attention on research problems using pluralistic approaches from quantitative and qualitative research and this is highlighted by Teddie & Tashakkori (2009); and Patton (1990). Integrating multiple methods designs can provide pragmatic advantages when exploring complex research questions. When used in combination, quantitative and qualitative methods complement each other and allow for a more robust analysis, taking advantage of the strengths of each (Greene et al. 1989; Miles & Huberman 1994 and Tashakkori 1998).

The benefits of using qualitative data is that it provides insights into a host of interrelated conceptual themes or issues during analysis (Bazeley 2004). Qualitative data can also be revisited during analysis in an iterative analytic process to allow for the recognition of emergent themes and insights. Conversely, quantitative data are fixed and one-dimensional and may mask or ignore underlying causes or realities i.e. they are composed of a single set of responses prospectively representing a conceptual category determined prior to data collection and they cannot change in response to new insights in analysis (Driscoll et al, 2007).

The combination of these methods aids in multiple ways of seeing, hearing, and

making sense of the social world (Greene 2008). A quantitative investigation alone will not suffice to explain the whole story often concealing the inherent characteristics that influence a disease like asthma. A qualitative exploration would yield rich information that gives the researcher different "pictures" of the problem.

Asthma is a disease that can present itself within multiple facets often obscured by the real mechanisms that play a part in its prevalence and management. To understand these mechanisms and contexts in play, this research adopted a holistic interdisciplinary approach utilising multiple methods, to explore and unfold this complexity in a robust real world context to explore the nature and role of the socio-environmental context in relation to the prevalence and management of asthma at Scottish General Practices.

3.6 Study Design

Research designs are essential in establishing the procedures to collect interpret and report data in research studies. Research designs are also useful because they help to guide the methods and decisions that researchers must make during their studies and set the logic by which they make interpretations at the end of their studies.

Borrowing features from a sequential explanatory multiple methods design (Creswell 2003), this research employed a modified study design integrating "expansion" where the scope of study is expanded by extending methods choices to more than one methodological tradition. Thus, it enabled selection of the most appropriate method for each construct within an expanded set of study focus and extending the range of enquiry.

The first phase involved analysis of quantitative data from a secondary dataset of a UK

wide asthma audit to explore how the prevalence of asthma in Scottish General Practices compared against the most common social deprivation index used in Scotland-SIMD. Since deprivation was a major problem in Scotland (Carstairs & Morris 1990) it was necessary to understand if social deprivation as measured by the SIMD index had a role to play in asthma prevalence as identified from the literature. The results from the analysis helped to advance the research into the next stage aiding in the selection of the Case Study sites where the next phase of enquiry included in-depth interviews with stakeholders involved in asthma care and management in the case study areas which completed the final stage of this research.

The advantage of using this design is that it aided the researcher in collecting and analysing diverse types of data that could be layered upon to provide an understanding to the research problem. It was useful to capture the best of both quantitative and qualitative approaches; and allowed strategies of inquiry that involved collecting data sequentially to guide the explanatory process thus providing multiple facets to the problem context. The different phases are described in the next sections of this chapter.

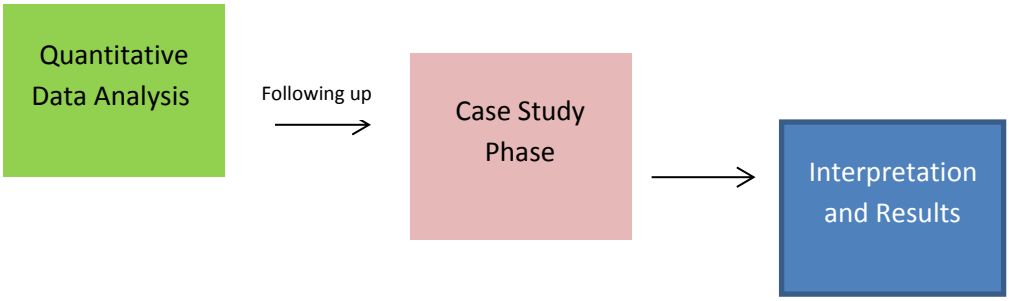


Fig 3.1 Modified Sequential Explanatory Multiple Methods Design

3.7 Quantitative data analysis

The literature review highlighted the importance of the role played by the physical and social environments in relation to asthma. In addition, the review also revealed some of the problems that existed in the management of asthma from the patient, practitioner and at the organisational scale. Scotland has a high crude prevalence rate for asthma (ISD SCOTLAND 2013; Masoli et al. 2004) and high deprivation is see in most urban locations (Scott et al., 2007).

In order to explore and understand the socio-environmental contexts in which patients with asthma were exposed to at the Scottish primary care level; the research employed a sequential approach which utilised multiple methods at different phases of the study. Hence this phase of the research analyzed a secondary dataset based on a UK wide asthma audit to examine the role of deprivation on asthma prevalence at the Scottish primary care setting. The advantage of using the UK wide asthma audit data set was that it had data on crude prevalence scores at General Practices (Primary care level and a deprivation score like the SIMD was integrated into the dataset. The

secondary data analysis formed the preliminary analytical methods employed in this phase which helped to analyze deprivation contexts in relation to asthma prevalence at the Scottish primary care setting. .

The research question that guided this quantitative phase was:

- Is the crude prevalence of asthma at Scottish General Practices more likely to be associated with the deprivation present in the area?

The dataset used and the data variables analysed are described in the next subsection.

3.7.1 General Practice Data

The General practice data was obtained from a UK-wide Asthma Audit from the Quality Outcomes Framework of the NHS collected from the period of 2001-2006. The Quality and Outcomes Framework (QOF) is a UK system for monitoring general practitioner (GP) activity and performance, introduced in 2004 for adjusting payments to GPs, based on disease-specific monitoring and treatment, focusing on some of the major contributors to morbidity in general practice like Cardio vascular diseases, COPD, Asthma etc. ISD publishes the following information from QOF:

- QOF points and payments achieved by GP practices
- Prevalence data for a range of conditions recorded in QOF registers (chronic heart disease, asthma, depression, diabetes mellitus, cancer, COPD etc.).
- Information on QOF exception reporting, i.e. numbers of patients excluded for reasons such as a treatment not being clinically appropriate, or the patient choosing not to attend review appointments (ISD SCOTLAND 2014).

Researchers have utilised the QOF data for ecological studies assessing the relationship between Coronary Heart Disease and socio-economic deprivation (Strong et al.2006), utilising prevalence rates of cardio vascular indicators in a national cross sectional study (Saxena et al. 2007), ill health (Downing et al. 2007), deprivation (Ashworth et al. 2007) and quality of care in relation to socio-economic deprivation (McLean et al. 2007).

Other sources of data for asthma are the Scottish Health Survey which contains individual data based on questions on respiratory symptoms and doctor-diagnosed asthma. Since the focus of this analysis was on General Practice (Primary care) data, the QOF data was utilised.

To ensure a wide spread of participating practices throughout the United Kingdom, practices were recruited to the audit project by the Respiratory Care Team from Glaxo Wellcome (later GlaxoSmithKline). From a total of 10,438 General Practices present in the UK (correct at the time of data collection), 1206 (11.55%) practices of all sizes and a wide geographical spread (Fig 3.2 on the next page) were recruited for the audit out of which 114 General practices were from Scotland (11% of the total Scottish General Practices).

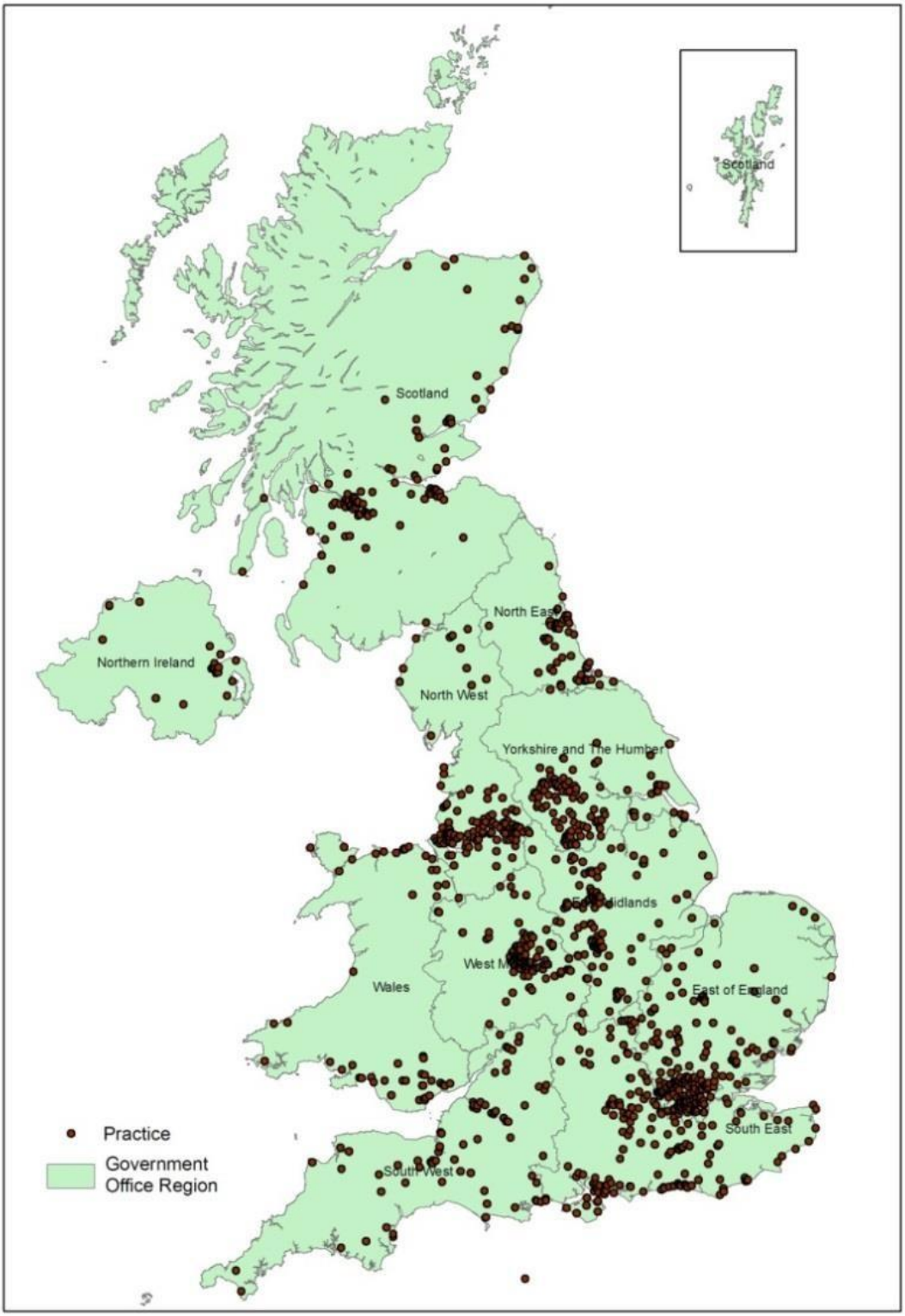


Fig 3.2 United Kingdom: Spread of Participating Practices in the Audit

It is important to note that there may be bias present in this cohort as even though it is a representative sample of most of the Practices in the UK, practices were encouraged to participate possibly because of better incentives received from the QOF or it can also be acknowledged that the practitioners were active in supporting such an initiative and get the Practice more involved.

The dataset contained information on crude prevalence rates for asthma at General Practices in the UK, practice population numbers, number of patients in the asthma register, information on the locations of each practice (Post codes, Address). In addition, it contained data on clinical variables relating to lung volumes and medication intake which were not taken into consideration for this present study. The main advantage of utilizing this asthma dataset was that it was used previously for a clinical study by Hoskins et al. (2011) to assess asthma control in the UK primary care setting to determine appropriateness of a variety of control assessment models in the management of asthma.

The data set required a thorough screening to evaluate and choose the variables that would be advantageous for this research which were the data on the practice population in each General Practice, and the asthma register in each General Practice. Another advantage was that a widely used social deprivation index like the Scottish Index of Multiple Deprivation (SIMD) could be incorporated to it.

The QOF data does not reflect the extent of the asthma problem in Scotland but it reflects how asthma management is carried out through General Practices, the sites which are at the heart of the management of the disease.

3.7.2 Crude Asthma Prevalence Scores

A Quality Outcomes Framework (QOF) crude prevalence rate for asthma in a General Practice is simply the total number of patients on the asthma register, expressed as a proportion or percentage of the total number of patients registered with the practice. QOF prevalence rates are what is known as "raw" or "crude" rates because they take no account of differences between practice populations in terms of their age or gender profiles, or other factors that influence the prevalence of health conditions (ISD SCOTLAND 2013). QOF prevalence scores are easily available and used for describing asthma prevalence by NHS Scotland through the ISD (ISD SCOTLAND 2013) and Scottish Public Health Observatory (SCOT PHO 2012).

3.7.3 Choice of SIMD as a Deprivation Index

The Scottish Index of Multiple Deprivation (SIMD) identifies small area concentrations of multiple deprivations across all of Scotland in a consistent way. The SIMD ranks small areas (called datazones) from the most deprived ranked 1st to the least deprived ranked 6,505th. The use of data for such small areas helps to identify 'pockets' (or concentrations) of deprivation that may be missed in analyses based on larger areas such as council wards or local authorities. By identifying small areas where there are concentrations of multiple deprivation, the SIMD can be used to target policies and resources at the places with greatest need (ISD SCOTLAND 2006). The SIMD combines 38 indicators across 7 domains at the datazone level, which have been combined into an overall index to pick out area concentrations of multiple deprivation. The overall index is a weighted sum of the seven domain scores (the percentage domain weightings have been shown in brackets): income (28%),

employment (28%), education (14%), health (14%), geographical access (9%), crime (5%), and housing (2%), [The Scottish Government, 2012]. A datazone with a higher score (e.g. 54.2) is considered to be more deprived than a datazone with a lower score (15.1). The datazones are ranked according to their scores and presented in the index.

The SIMD index was chosen as the deprivation index to be compared because of its wider links to the contextual and compositional aspects related to place, was concentrated on aspects of deprivation most relevant to asthma, was utilised in a range of studies relating to health in the Scottish context (Day 2008; Macintyre et al. 2008; Richardson et al. 2013) and the importance of its acceptance in policy and funding support from the Scottish Government compared to other deprivation indices. The distinct feature of the index is described in detail in Chapter 4, Section 4.2.2

3.7.4 Data Analysis Stage

Although the QOF is an important and readily available data source, it contains information only on the location of the General Practices but not the locations of the patients in the practice or the extent of the practices respective catchment areas. This in turn limits the basis on which deprivation data can be matched to the asthma data present in the QOF data set.

Hence the easiest way available was to link the post code data of each General Practice to the datazone it is located in and then link the deprivation rate of the datazone it is located in to the General Practice. Thus, in this analysis the level of deprivation experienced by the population in the locality of the practice was used as a reliable proxy for the level of deprivation experienced by the whole registered practice population.

Though, it is also important to acknowledge that not all patients registered in the Practice live within the Practice precincts or experience the same effects as the whole population taking into account 'ecological fallacy' (Piantadosi 1988) which is mainly due to the absence of individual level data, these values can be under estimated over estimated. But, this method was used in the studies by Strong et al. (2006) to compare general practice level socioeconomic deprivation; Ostler et al. (2001) studying the influence of socio-economic deprivation on the prevalence and outcome of depression in primary care for the Hampshire Depression Project; and Hippisley-Cox et al. (2001) in a cross-sectional study that studied whether single handed general practices offered poorer care.

McLean et al. (2008) got around this aspect in their study exploring practice postcode versus patient population comparing data sources in England and Scotland by utilising both the practice based post code deprivation rates in addition to the mean practice population deprivation rates. They utilised publicly available data from the Quality Outcomes Framework (QOF) to compare prevalence rates of ten diseases (coronary heart disease, diabetes, stroke, hypertension, COPD, asthma, cancer, mental health, thyroid and epilepsy) against the Index of Multiple Deprivation (IMD) at General Practices in England and Scotland. Deprivation for England and Scotland was measured using the income domain of the Index of Multiple Deprivation (IMD) for each country because it is the only domain calculated in a similar way in both countries (ODPM 2004; The Scottish Government 2012). The authors compared the mean prevalence rates for the ten clinical domains against practices located from the least to the most deprived deciles as measured by the income domain. The authors noted that the use of data based on the practice population may help to alleviate some

of the difficulties encountered from the use of aggregated data.

It was not possible to run a basic correlation test like the Pearson's with the SIMD data as it can violate a few statistical criteria (Havlicek et al. 1977) potentially because it is not on a straight line, deliberately hard to stretch out in scale and doesn't follow normal distribution. Thus, the best possible way was to run other non-parametric alternatives like a comparison test utilising data sources present within the SIMD and the crude prevalence rate for asthma and a significance test for the difference in crude asthma prevalence rates between the most deprived and least deprived deprivation categories used in the comparison test.

This analysis first adopted a non-parametric comparison method similar to the one utilised by McLean et al. 2008 and compared the mean crude prevalence rate of asthma against the overall mean of the SIMD scores for General Practice per decile (Section 3.7.6). The analysis extended the comparison by including the mean practice deprivation rates (deprivation rates of the patient's postcode location), the income domain of the SIMD and the percentage of people living in the 15% most deprived areas as denoted in the SIMD index. Adding the income domain made it easier to interpret the proportion of residents in receipt of state benefit on the grounds of low income as the higher the income score, the more income deprived the population is. Analysis of the SIMD has historically tended to focus on the 15% most deprived datazones (The Scottish Government 2012) and in this analysis it would give an insight into the rates of crude prevalence of asthma in the most deprived categories of the population.

To understand the difference in crude asthma prevalence rates between the most deprived and least deprived deprivation categories used in the comparison test, a non-

parametric Mann-Whitney U-test of significance was utilised. The null hypothesis assumed was that the two groups of practices used for comparison come from the same population (i.e. no statistically significant difference between the groups), compared to the alternate hypothesis that they come from different populations (i.e. is a statistically significant difference).

These analyses to helped to visualise the differences across the various domains and see for associations.

The next sections denote the ethical approval and data management, and how the data was classified and compared.

3.7.5 Ethical approval and Data management

Permission was sought to utilise the asthma audit dataset from the Caldicott Guardian at the NHS Tayside in April 2011 and approval to utilise the dataset was granted in May 2011. The data was first cleaned and then collated on an SPSS spreadsheet with the General Practice locations, datazone codes, practice population, asthma register, deprivation rates of all the domains this analysis looked into (Overall SIMD, Income, % of people living in the 15% deprived datazones and Overall mean practice population assigned SIMD scores).

3.7.6 Data classification and comparison

First, the SIMD deprivation rates of all the datazones in Scotland for the domains looked in this analysis (the overall SIMD scores, mean practice population scores, Income and % of people living in the 15^{th} most deprived zones) were classified into quintiles Q1 to Q5. The General Practice crude prevalence scores of asthma from the

datazones they were located in were matched to each quintile and the mean crude prevalence scores were tabulated to fill the comparison table and interpreted for the results.

An example of the comparison table is shown in Table 3.1 below.

	Mean asthma prevalence rates per decile			
Method of assigning deprivation to GP practice =>	*Quintiles based on overall SIMD score associated with practice postcode* ***(source A)***	*Quintiles based on SIMD income domain rate associated with practice postcode* ***(source B)***	*Quintiles based on % of patients in practice living in 15% most deprived data zones* ***(source C)***	*Quintiles based on overall SIMD - practice population assigned values* ***(source D)***
Most deprived quintile Q1				
Q2				
Q3				
Q4				
Least deprived Q5				
Q1-Q5 (Difference)				
Ratio most: least deprived				
Significance Test (Q1 &Q5) p <0.05				

Table 3.1 Comparison: SIMD Deprivation X Crude Prevalence rates of asthma

The results from the analysis drove the need to do a case study at two General Practices in Scotland of dissimilar deprivation levels to understand the way health professionals (and related stakeholders) understand the factors that shape the causation and prevalence of asthma (including social and environmental contexts), and how this in turn shapes their management of the condition in their practice. The case study phase is described next.

3.8 Case study phase

A case study sets out to capture contemporary phenomenon within a real world setting when the boundaries between phenomenon and context are not really evident (Yin 2003). The case study in this phase of the research explored how the context of the environment present in an area shaped the management of asthma at Scottish General Practices and if this context differed across areas with dissimilar prevalence and deprivation characteristics. This was done by exploring the perspectives of stakeholders involved in asthma care and management on the wider set of contextual place factors (ranging from the physical environmental, social and disease management factors) that were operating across different scales in the environment of an area.

Thus, the "Case" for this case study was defined as the study of asthma in a General Practice that had a high crude prevalence and located in an area of high deprivation compared against a General Practice that had a lower crude prevalence of asthma and located in an area of middle/ lower deprivation level.

A single embedded case study design (Yin, 2003) was selected for this case study.

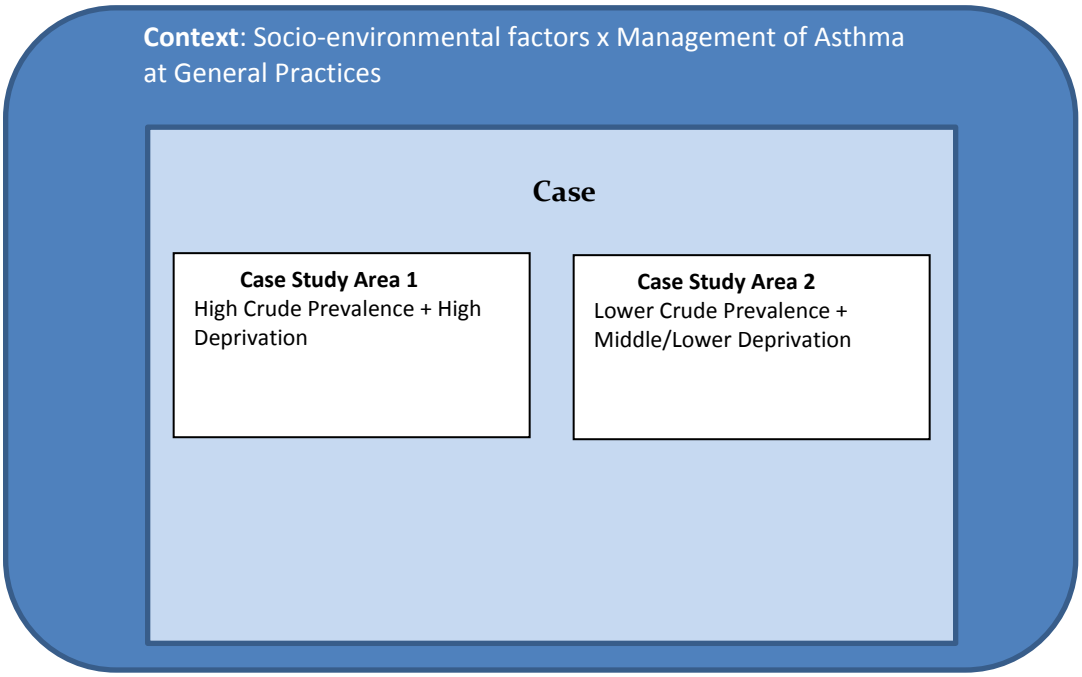


Fig 3.3 Single Embedded Case Study Design

This design incorporated two units of analysis identified by the crude asthma prevalence and deprivation characteristics. This helped to analyse and compare two dissimilar contexts in relation to crude prevalence and deprivation (High crude prevalence + High deprivation *vs* Low crude prevalence + middle/lower deprivation) enhancing the insights into the case and helped in the selection of the case study sites which is described next.

3.8.1 Selection of case study sites

Dundee was chosen as the case study site area as it is similar to other Scottish cities having mixed deprivation levels (The Scottish Government 2012) and had General Practices that matched with the definition of 'case' in the study design from the asthma audit dataset.

Letters of invitation to participate in the research were sent to prospective General Practices identified from the dataset. The time taken from the initial invitation to the final agreement to participate in the study took a couple of months as the Practice Manager could only discuss research invitation proposals during monthly practice meetings with all the GPs and Nurses. Finally, two General Practices that agreed to participate in the research were selected as the case study sites. The two Practices selected were Litchfield Practice (name anonymised) which was located in a high deprivation area and had a high crude prevalence of asthma and Vestville Practice (name anonymised) that had a lower deprivation rate and lower crude prevalence of asthma. The next section outlines the research questions that guided the case study.

3.8.2 Case study research questions

The primary questions that guided the case study phase were:

1) How do place factors shape the management of asthma from local environmental contexts?
2) How did the stakeholders (described in detail in the next Section 3.8.3) understand the multiple and complex determinants of asthma in the areas?
3) Does asthma management (including self-management) vary between areas of different deprivation levels and if so, how?
4) Does support to management of asthma at General Practices differ between the stakeholders at the General Practice, Support Groups and Health Board level?

3.8.3 Case study methods

The study employed a descriptive case study analysis of two General Practices located in areas of dissimilar deprivation levels in Scotland by utilising in-depth open ended semi structured interviews with stake holders involved directly or indirectly with asthma care and management (2 General Practitioners, 2 Practice Nurses, 1 Respiratory Nurse, 1 Community Health Worker, 2 Asthma Support Groups, 2 Local Council Officials-Environmental Manager, Housing Officer and 3 Health Board officials in charge of health-Respiratory Consultant, Environmental Public Health Specialist and Public Health Manager).

The case study interview questions that were utilised to address the interviews phase sought to understand the role of socio-environmental contexts in shaping the management of asthma locally from the stakeholder's perspective and how management of asthma especially self-management care were viewed and understood

among practitioners and health professionals involved in asthma care.

These interviews helped to build a picture from the perspectives offered from a range of stakeholders involved directly or indirectly with asthma care and management. The advantages of employing interviews in the case study was that it targeted directly on the case study topic and was insightful to deduce perceived casual inferences from the interviewees. It is also worthy to acknowledge response bias, inaccuracies that may be added due to poor recall and reflexivity to understand that the interviewee may provide responses to what the interviewer wants to hear.

The stakeholders who were involved directly with the management of asthma at the General Practices ranged from the General Practitioners, Nurses, Community Health workers and asthma support group workers. The Health Board officials (Respiratory Consultant, Environmental Public Health Specialist and Public Health manager) had no direct involvement with patients but were involved in promoting and overlooking chronic disease management programs that were pertinent to the primary care level. The views from the Local Council officials (Environmental Manager and Housing Officer) helped in providing an environmental dimension to the evidence gathered for the case study.

3.8.4 Selection of Case study participants

Initially separate Letters of Invitation *(Appendix 1)* to participate in the proposed Case Study were sent to Practice Managers of General Practices, Local Asthma Support Groups, Local Council and Health Board to which the practice is located.

The invitation letter was accompanied by study information leaflet (Appendix 2)

giving detailed information about the study and a reply slip. They were given the opportunity to seek clarification on any points associated with the study prior to agreeing to take part Interested General Practices, Local Asthma Support Groups and the Local Council and Health Board were requested to confirm participation either by email/phone or by completing and returning the reply slip in a pre-paid self-addressed envelope. The General Practices, Local Asthma Support Groups, Local Council and Health Board employed a self-selection procedure to designate General Practitioners, Nurses, an Asthma Support Group Official, Community Health Workers, a Local Council Official and a Health Board Official who will participate in the interview respectively. Upon receipt of responses, the researcher contacted the interested Practice manager of the General Practice, Local Asthma Support Group, Local Council and Health Board and made further arrangements for the interview.

Interviews were arranged for times out with which Practitioners or Nurses are involved in direct patient care but took place within normal working hours (unless requested by them) to minimise disruption to their normal working day.

Health Personnel, Support Workers and Civic Officials were assured of the anonymity of the data collected and that in no reports (verbal or written) will their practice, organisation or they as individuals be identified.

A signed consent form *(Appendix 3)* was obtained once participation has been agreed in principle and prior to the commencement of the interview. Interviews were audio recorded with the prior consent of the participants. Consent was also sought from all respondents for participation in the interviews. Practices would be offered a written report of their case highlighting the findings from their practice. Written reports will

also be offered to the Local Asthma support group, Local Council and Health Board.

3.8.5 Interviews

Semi-structured interviews were conducted with General practitioners, Practice Nurses, Community Health Workers, Asthma Support Group Official, Officials from the Local Council and Health Board. The interview questions were developed drawing on themes which emerged through the literature review and secondary data analysis phases. A balance had to be struck between the need to gain enough information but also respect the interviewee's availability and time schedule. The interviews were of half an hour in duration and consent was sought for audio recording the conversations. A topic guide (*Appendix 4)* was used to structure the conversation that explored the experiences and perspectives about the role of the environmental context in influencing asthma care and management from the stakeholders.

3.8.6 Recording and Transcription

All interviews were recorded on a Sony digital voice recorder and were downloaded to a password protected computer. The interviews were transcribed verbatim by the researcher.

3.9 Ethical Approval

Ethical approval was sought prior to any contact being made with the stakeholders' i.e. The General Practices, Local Asthma support groups, Local Council and Health Board. The University Research Ethics Committee (UREC) granted approval to carry out the interviews in February 2013.

3.10 Data Handling

All data including raw data such as taped conversations and interview notes were adequately secured (under lock and key) and/or password protected where appropriate. The researcher transcribed the data himself. Processed personal data such as transcripts were appropriately coded and anonymised. Data would be securely held until the successful completion of the thesis examination and publication of papers. Subsequently, it would be destroyed immediately after the completion of the research.

3.11 Review Software

NVivo version 10 was used to transcribe the interview data. The transcripts were coded thematically. This information was combined with the field notes taken shortly after the interviews which included reflections on how the interview went and aided in the final interpretations of the interview data.

3.12 Case Study Data Analysis Plan

Drawing on from the principles of framework analysis (Gale et al. 2013) it was possible to analyse the transcripts using codes and highlight the main findings on an Excel Spreadsheet. This helped to arranging the themes giving an overall picture to understand the perceptions of the stakeholders on the socio-environmental contexts individuals with asthma were exposed had the potential to shape the crude prevalence and management of asthma at the selected General Practices.

3.12.1 Coding used in the data analysis to describe the key respondents

Case Study Area 1 (High Crude Prevalence+ High Deprivation)	Litchfield (name anonymised)
Case Study Area 2 (Low Crude Prevalence +Middle Deprivation)	Vestville (name anonymized)
General Practitioner (Case Study Area 1)	GP-Litchfield
General Practitioner (Case Study Area 2)	GP-Vestville
Practice Nurse (Case Study Area 1)	PN-Litchfield
Practice Nurse (Case Study Area 2)	PN-Litchfield
Respiratory Nurse	RSPN
Community Health Nurse	CHN
Asthma Support Group 1	ASG1

Asthma Support Group 2	ASG 2
Local Council Official (Housing Manager)	LC-HM
Local Council Official (Environmental Manager)	LC-EM
Health Board Official (Respiratory Consultant)	HB-RSPCON
Health Board Official (Environmental Public Health Consultant)	HB- EPHC
Health Board Official (Public Health Manager)	HB-PHM

Table 3.2 Coding used for classifying interview data

3.13 Limitations and contributions of the case study phase

The limitations of this case study was that it did not involve patients' perspectives as the focus of this case study was to understand the way in which asthma was addressed and managed within these environmental contexts at the General Practice level by the stakeholders. Their perspectives are very significant as they are the main sources involved directly or indirectly in the care and management of the disease and exploring patient perspectives would be the next stage of this research in future. The absence of the patient's 'voice' helped in reflecting upon and interpreting the views of healthcare professionals (i.e. as opinions rather than as the 'truth' about patient motivations or actions).

The distinct contribution of this case study to the thesis was that it gave insights on how health professionals perceived their area, patient population and how they integrated this perceptions it into their practice as their understanding or lack of understanding or their inability to act upon their understanding of the importance of the socio-environmental context was one of key factors that shapes their management of asthma

3.14 Conclusion

The multiple method stance adopted in this research proved to be challenging but ultimately rewarding. The quantitative analysis examined the relationship between the crude prevalence rates of asthma and deprivation measured at the practice and patient level at General Practices in Scotland. The secondary data set was able to provide information on primary care level crude prevalence rates for asthma as it was an exclusive dataset that was utilised for an asthma specific audit. The SIMD index was used to provide a comprehensive and reliable indicator for deprivation rates and have been used in previous health research. The results from the analysis led to move beyond deprivation and broaden the examination of asthma prevalence from a focus on deprivation to an appreciation of numerous contextual factors (at a range of scales) and utilised a case study method to explore the perceptions of stakeholders involved in asthma care have on the nature and extent of socio-environmental factors that shape the management of asthma at General Practices in Scotland.

In summary, this chapter has laid the methodological basis for the remainder of the thesis by outlining and evaluating the methods which were used to collect the data. The thesis can be thought as addressing the nature and role of the socio-

environmental context in relation to the prevalence and management of asthma at Scottish General Practices and the way that health professionals (and related stakeholders) understand the factors that shape the causes and prevalence of asthma (including social and environmental contexts), and how this in turn it shapes their management of the condition in their practice. The methodologies were chosen to deconstruct the "Environmental Context" within asthma management and the case studies helped to give better insights into asthma management which the results from the two phases reveal in the subsequent chapters. The contribution of this Chapter to the overall thesis is to recognise the importance of a multi-disciplinary approach to the study of asthma (to capture the multiple factors that shape asthma prevalence and management).

The next chapter explores the relationship of deprivation to asthma crude prevalence rates at Scottish General Practices first, by giving an overview of studies that looked at deprivation indices to asthma outcomes in the UK and then proceeds to examine this relationship in the Scottish context by including an empirical analysis of a secondary data set from a UK wide asthma audit, comparing the crude prevalence rates of asthma at Scottish General Practices with the Scottish Index of Multiple Deprivation (SIMD) measured at both the practice postcode and patient postcode levels.

Chapter Four

Asthma prevalence and deprivation in the Scottish context

4.1 Introduction

The previous chapter described the methodological approaches adopted that provided a framework for data exploration, integration, analysis and interpretation and contributed to recognise the importance of a multi-disciplinary approach to the study of asthma (to capture the multiple factors that shape asthma prevalence and management) in this thesis.

This chapter explores the relationship of deprivation to asthma crude prevalence rates at Scottish General Practices as deprivation emerged as one of the dominant socio-environmental factors from place contexts found to be associated with asthma outcomes from the literature review. Given its prominence in the literature and its undoubted importance, it was essential to study in greater detail the relationship between measures of deprivation and asthma crude prevalence rates.

First, an overview of studies that looked at deprivation indices to asthma outcomes in the UK was undertaken to understand the methods and findings, and to interpret what they reveal about the role of deprivation in the study settings. The chapter then proceeds to examine this relationship in the Scottish context by including an empirical analysis of a secondary data set from a UK wide asthma audit, comparing the crude prevalence rates of asthma at Scottish General Practices with the Scottish Index of

Multiple Deprivation (SIMD) measured at both the practice postcode and patient postcode levels.

The results from the analysis contributed to the understanding of what a conventional deprivation measure does not reveal about asthma–place contexts and also helped to advance the research into the next stage to explore the way that health professionals (and related stakeholders) understand and respond to these factors that shape the causation and prevalence of asthma (including socio-environmental contexts); and how this in turn shapes their management of the condition in their practice.

The literature review illustrated that there has been renewed interest in recent years in the role of place and how it contributes to shaping health outcomes (Macintyre et al. 2002; Stafford et al. 2003; Curtis et al. 2004; Poortinga et al. 2008). This is because in several studies that have explored adverse health outcomes, unexplained effects have been found even after accounting for individual level characteristics, and there have been attempts to explain these as 'neighbourhood' or 'area' effects. Measures of area-level deprivation have often been used as the best available source for exploring these effects.

The understanding of place/contexts is complicated, there is no perfect measure, and the concept of 'deprivation' has (rightly or wrongly) been used sometimes as the nearest proxy for it (Sloggett et al. 1994; Diez Roux 2001; Bancroft et al. 2003). Policy makers, health professionals and researchers look for possible associations between prevalence rates of diseases with a range of possible determinants including deprivation and morbidity levels to determine cause, response and programme delivery e.g. cancer (Dickinson 2000; Whynes et al. 2003), epilepsy (Morgan et al.

2000), diabetes (Meadows 1995), depression (Ostler 2001), asthma (Salmond et al. 1999), and heart disease (Smith et al. 1998; Strong et al. 2006). Frequently, research addressing those associations tends to centre on analysing available area aggregated data sets. This recognises that programme delivery can impact not just on individuals but the same data may also be drawn on in the absence of access to individual level data, and as proxies for unmeasured or unknown individual level factors.

The literature review showed deprivation was associated with the admission rates to hospitals for asthma (Walters et al. 1995; Watson et al. 1996; Salmond et al. 1999; Roberts et al. 2012), prevalence rates (Austin et al. 2004; Basagaña et al. 2004), symptoms and morbidity (Duran-Tauleria & Rona 1999; Jordan et al. 2014) and uptake of medications (Kwong et al. 2002). There were also a few studies which did not find any association (Strachan et al. 1994; Austin 2005; Laurent et al. 2008; Gale et al. 2011). In other words, the relationship between asthma and deprivation is complex and may not be ideal as a proxy to target disease mitigation strategies or clinical management program delivery grounded on area deprivation values alone. There may be other factors present in the background which conventional deprivation scores don't reveal which may shape disease outcomes especially where place effects on health are prominent.

To understand this aspect fully, the chapter first examines the asthma–place contexts relationship in relation to deprivation by understanding the approaches other studies have used to examine asthma prevalence and management against deprivation indices from the literature and explore what they tell us about this relationship. To help illustrate and elaborate this aspect important for the Scottish context where the focus

of this research is, an empirical analysis is undertaken, comparing the relationship of asthma prevalence with a deprivation index (SIMD) utilising a secondary data set of a UK wide asthma audit and the results obtained were critically interpreted to understand what a conventional deprivation measure does/ does not reveal about asthma–place contexts and helped this research to advance into the next stage of enquiry (Chapter 5).

The next section explores the current literature on deprivation and asthma pertinent to the local context by briefly describing the common deprivation indices used and expands to include studies that looked into the two most common deprivation indices used to study asthma and deprivation.

4.2 Deprivation and Asthma in the local context

People can be deprived of adequate education, good quality housing, rewarding employment, sufficient income, good health and opportunities for enjoyment. Disadvantaged areas are locations in which people tend to be relatively poor and likely to suffer from misfortunes such as ill health and general social misery (Dorling 1996). Various indexes have been devised since the 1980s to identify relatively deprived areas in the United Kingdom. These include the Jarman Underprivileged Area Index (Jarman 1983), the Townsend Index (Townsend 1987), the Carstair's Index (Carstairs & Morris 1989), the Index of Multiple Deprivation (UK Government 2013) and the Scottish Index of Multiple Deprivation–SIMD (The Scottish Government 2012). Mostly calculated at the electoral ward and datazone levels, these indices are predominantly based on a composite of census derived variables which act as indicators of relative conditions between areas. The resulting deprivation scores are highly influential for allocating

public resources and regularly used as explanatory variables in health outcomes (Norman et al, 2005 ; Boyle et al, 2001).

4.2.1 Townsend Index

From the studies gathered from the literature review, the Townsend Index was the most common deprivation index found to be utilised in studies undertaken in the United Kingdom that explored asthma and deprivation (Walters et al. 1995; Burr et al. 1997;Duran-Tauleria & Rona 1999; Kwong, et al. 2002).

Townsend (1987) defined deprivation as:

"A state of disadvantage relative to the local community, wider society or nation to which an individual, family or group belongs" (page 125).

The four variables that make up the Townsend index obtained from the 1981 census are ownership of home, overcrowding, unemployment and ownership of car. According to Townsend, these variables reflect the socio-economic circumstances representing the state or condition of deprivation. The Townsend Index is calculated at the ward scale based on the UK census geography for local government areas. Pearce et al. (2011) state that wards offer a balance between the requirement for a relatively small unit to reflect the fine spatial variation in both physical and socio-economic environments, but are also advantageous because many other social and economic data in the UK are reported at this spatial level.

Phillimore et al. (1994) noted that the Townsend Index has served as a general measure of deprivation for academic studies of health care need, helping various resource allocation mechanisms intended to target resources to areas of greatest social

need. The simple nature of the score and its use of readily available data meant that it could be calculated directly for any geographical areas based on census geography. The ward that had a higher score like +4.1 based on the index is considered to be more deprived than a ward that had a score of -2.1.

A good example where place effects or contextual aspects of the physical environment, asthma and deprivation as measured by the Townsend Index has been taken into account was seen in a study by Walters et al.(1995) which explored hospital admission rates for asthma and respiratory disease in the West Midlands and its relationship to air pollution levels. Age-sex standardised hospitalisation ratios (SHRs) were calculated by the indirect method for all electoral wards in the study. Two year mean levels of smoke, SO_2, and NO_2 were calculated for each electoral ward in the study. The relationship between SHR and mean levels of pollutants was then investigated by bivariate and multivariate regression analysis. Bivariate regression analysis was carried out to determine the relationship between these pollutants, hospital admissions, ethnicity and Townsend scores. The results indicated that socio-economic deprivation was a significant predictor of hospital admission rates for respiratory disease in older individuals and children.

Exploring the social contexts of the environment and asthma, Burr et al. (1997) conducted a study in Cardiff, Wales to see whether children living in socially deprived areas were more likely than other children to be admitted to hospital for asthma, and, if so, whether their excess risk was attributable to a higher prevalence of asthma or poorer treatment. Hospital admission rates for asthma were obtained for Cardiff electoral wards and compared with the Townsend index of deprivation. Separately, a

survey of respiratory symptoms was conducted in schoolchildren and the prevalence of symptoms was compared with the Townsend index and asthma admission rate for the schools' catchment areas. The electoral wards corresponding to the schools' catchment areas were identified, and their Townsend indices were correlated with the admission and prevalence rates using Spearman's Rank correlation coefficient. The results showed that asthma admissions were strongly correlated with Townsend indices at all ages.

A comparative study of two geographical settings in relation to asthma prevalence and deprivation was done by Duran-Tauleria et al. (1999) who explored the socio-economic variation in the prevalence of asthma symptoms in English and Scottish children. Data was collected from the National Study of Health and Growth (NSHG) survey on primary school children from 56 study areas in England and Scotland, including information on asthma symptoms and socioeconomic variables. Multiple logistic regression analyses were carried out for each group of symptoms against area of residence with the Townsend deprivation score. The results indicated that the persistent wheeze associated with asthma was more prevalent in poorer areas than in less deprived areas again indicating how contexts associated with a place has been taken into account.

A similar study by Kwong et al. (2002) explored the relationship of socioeconomic factors with the diagnostic and treatment behaviour in children with chronic respiratory symptoms was conducted in the city of Sheffield. They surveyed a single school year of Sheffield schoolchildren aged 8–9 years using a parent respondent survey based on the International Survey of Asthma and Allergies in Childhood

(ISAAC) questions. Postcode data obtained from the questionnaire were used to assign a Townsend score (derived from home and car ownership, employment status, and household size obtained from census data) to each respondent household based upon the electoral ward. The authors noted that by assigning Townsend scores by electoral ward area they assumed that everyone within a specific electoral ward was equally deprived. The results showed that asthma morbidity and severity increased according to the level of socioeconomic deprivation.

The Townsend Index (Townsend 1987) has only four variables but encompasses a multi-dimensional approach integrating factors that form part of the basic necessities of life for e.g. home, fuel, diet etc. with a wider socio-environmental dimension that includes education and employment. It also needs to be noted that non-home ownership and non-car ownership could give places with high values for these variables and will tend to come out higher on the resultant index.

Walters et al. (1995) noted that there were some potential drawbacks to the use of the Townsend score as its scope is narrower looking at place contexts. Electoral wards with an extremely poor estate at one end and affluent areas at the other end do not reflect the level of deprivation of people in some parts of the ward due to the ecological fallacy. Deprivation in rural areas would not be adequately reflected in the index as the inclusion of car ownership especially for poor people living in rural areas without a car may have a much more deprived score, than in urban areas with plentiful public transport.

The next subsection describes another widely used deprivation index relevant to Scotland.

4.2.2 The Scottish Index of Multiple Deprivation

The Scottish Index of Multiple Deprivation identifies small area concentrations of multiple deprivations across all of Scotland in a consistent way. The SIMD ranks small areas (called datazones) from the most deprived ranked 1st to the least deprived ranked 6,505th. The use of data for such small areas helps to identify 'pockets' (or concentrations) of deprivation that may be missed in analyses based on larger areas such as council wards or local authorities. By identifying small areas where there are concentrations of multiple deprivation, the SIMD can be used to target policies and resources at the places with greatest need (ISD SCOTLAND 2006). The SIMD combines 38 indicators across 7 domains at the datazone level, which have been combined into an overall index to pick out area concentrations of multiple deprivation. The overall index is a weighted sum of the seven domain scores (the percentage domain weightings have been shown in brackets): income (28%), employment (28%), education (14%), health (14%), geographical access (9%), crime (5%), and housing (2%), [The Scottish Government, 2012]. A datazone with a higher score (e.g. 54.2) is considered to be more deprived than a datazone with a lower score (15.1). The datazones are ranked according to their scores and presented in the index.

The SIMD covers datazones which have a smaller geographical boundary than wards that were looked at in the Townsend Index. Compared with the constituents of the Townsend Index, some of these factors (unemployment, home ownership, overcrowding) are captured and incorporated into the SIMD across its seven domains however, the SIMD is a measure of area deprivation (Office of the Chief Statistician and Performance 2013).

One of the variables in the SIMD, the income domain, identifies areas where there are concentrations of individuals and families living on low incomes. This is done by looking at the numbers of people, both adult and children, who are receiving, or are dependent on, benefits related to income or tax credits.

The health domain in the SIMD identifies areas with a higher than expected level of ill health or mortality given the age sex profile of the population (The Scottish Government 2012). It incorporates standardised mortality ratios, emergency stays in the hospital, proportion of people being prescribed drugs for anxiety/depression or psychosis, proportion of live single births, hospital stays due to alcohol misuse and drug misuse. Though it does not capture a physical environmental dimension related to a disease like asthma for e.g. air pollution and respiratory diseases or weather related incidents like pollen counts, it does capture the type of behaviour patients may exhibit (alcoholism, drugs) that adds into the social context.

The variables used to tabulate the housing deprivation domain in the SIMD are overcrowding and lack of central heating. The overall SIMD index is weighted differently for each domain and it acknowledges the aspects of the built environment to understand if poor or even better housing quality can potentially amplify factors that can influence diseases like asthma from the physical and/or social environment. A house which can be overcrowded can have members belonging to the lower end of the socio-economic spectrum adding a compositional factor to this context. Thus, a deprivation index like the SIMD includes different variables that capture wholly or partially the different contexts being studied.

Austin (2005) explored the association of deprivation and smoking with the prevalence

of asthma, wheeze and quality of life in Scotland. The study utilised a survey using the International Study of Asthma and Allergies in Childhood (ISAAC) methodology (ISAAC 2011) in children aged 13–14 years attending Scottish schools. The sampling frame used in the study included mixed sex state secondary schools with over 100 pupils in each school year for every region, including Orkney, Shetland, and the Western Isles, together with the metropolitan areas of Edinburgh and Glasgow. One school from each region/island was selected randomly from the sampling frame. Deprivation scores and ranks were derived from the Scottish Index of Multiple Deprivation (SIMD). In order to assign deprivation ranks, pupils were asked for the first five digits of their postcode. The study adopted student's t test to examine the linear trend of prevalence of symptoms, use of services, and quality of life factors across deprivation quartiles. Logistic regression analysis was used to assess the effect of deprivation on severity of wheeze and quality of life factors, simultaneously adjusting for smoking status, gender, and co-morbid conditions. The results indicated that there was no association between deprivation and self- reported asthma or hay fever.

Though the SIMD reflects both the rural and urban population there are differences in the way rural areas experience deprivation than urban populations (e.g. in income and employment due to fewer opportunities to find a job that matches their skills, greater likelihood of in work poverty, less job security maybe due to seasonality and reduced opportunity for career development).

The SIMD provides a better domain to compare deprivation against asthma as it covers a larger set of variables than the Townsend Index in revealing place contexts better. Deprivation is multidimensional and the SIMD attempts to capture some of the

dimensions through its seven domains. However, the SIMD does not directly measure the social aspects of deprivation, nor does it measure individual deprivation, but is instead a measure of area deprivation. When the contextual and compositional aspects related to a place are taken into consideration, it could be argued that deprivation is felt by the people living in an area and not the place and it is complex to build an individually based deprivation measure. The next subsection explores this aspect further describing the complexities existing when using deprivation indices.

4.2.3 Deprivation indices: Area aggregated scores vs Individual level deprivation

From the studies critiqued in the previous section it was possible to understand that place/contexts in relation to asthma and deprivation is complicated and there is no perfect measure even though the concept of deprivation has been used as a nearest proxy for it sometimes. Most research addressing these associations tends to centre on analysing data available on area aggregated datasets. Deprivation indices that use aggregate level datasets do not measure individual level deprivation and hence will have differences in the importance attached to "place effects on health" as they may provide different emphasis on what a place effect is (Macintyre et al., 2002) while building associations with any comparing variable. However, that is not the main focus of this research.

There are inherent risks in using area level figures to describe the characteristics of all individuals in the area which can account for ecological fallacy (Piantadosi 1988). This is mainly due to the absence of individual level data or these values can be under-estimated or over-estimated. Another way to get around this was done integrating

mean practice deprivation scores which are based on the average of the deprivation scores from the areas where the practice population resides.

McLean et al. (2008) in their study exploring practice postcode versus patient population comparing data sources in England and Scotland utilised both the practice based post code deprivation rates in addition to the mean practice population deprivation rates. They utilised publicly available data from the Quality Outcomes Framework (QOF) to compare prevalence rates of ten diseases (coronary heart disease, diabetes, stroke, hypertension, COPD, asthma, cancer, mental health, thyroid and epilepsy) against the Index of Multiple Deprivation (IMD) at General Practices in England and Scotland. Deprivation for England and Scotland was measured using the income domain of the Index of Multiple Deprivation (IMD) for each country because it is the only domain calculated in a similar way in both countries (ODPM 2004; The Scottish Government 2012). The authors compared the mean prevalence rates for the ten clinical domains against practices located from the least to the most deprived deciles as measured by the income domain. The authors noted that the use of data based on the practice population may help to alleviate some of the difficulties encountered from the use of aggregated data.

4.2.4 Summary

To summarise, the studies revealed that deprivation was measured at resolutions ranging from the level of geographic residence measured at the level of wards or datazones. Whether deprivation can act as an effect modifier may depend on the resolution at which it is measured and these interactions cannot be generalised or be transposable from one setting to another as each place has a different set of context

and composition it is confronted with. It was also seen that there was a lack of primary care data from General Practices where patients are seen for asthma in the first place as most studies looked at asthma data from hospital admission rates for asthma (Walters et al. 1995; Burr et al. 1997) or self-reported survey data (Duran-Tauleria et al. 1999; Kwong et al. 2002).

In the context of this research it was necessary to understand the relationship between the prevalence rates of asthma at the primary care level (General Practices) in Scotland against a deprivation index like the SIMD which would give an insight into the Scottish primary care context. To explore this further, an empirical analysis was undertaken that explored a secondary dataset based on a UK wide asthma audit to examine the role of deprivation on asthma prevalence in the Scottish primary care setting.

Section 3.7.1 in Chapter Three earlier describes the General Practice data used in this analysis, crude asthma prevalence rates (3.7.2), choice of the SIMD as the deprivation index (3.7.3),data analysis stage (3.7.4), ethical approval and data management (3.7.5) and data classification and comparison (3.7.6). The next section reports the results from the data analysis stage.

4.3 Results

The results from the data analysis stage are presented in the following sub sections to understand if deprivation was associated with the crude prevalence of asthma at Scottish General Practices.

4.3.1 General Practice Selection

From a total of 10,438 General practices present in the UK (correct at the time of data collection), 1206 (11.55%) practices in the UK of all sizes and a wide geographical spread were recruited for the asthma audit. 114 General practices located in Scotland were identified for the analysis from the asthma audit. Out of these, 8 practices had incomplete data to be incorporated into the dataset and 2 practices had been closed down. Finally a total of 104 General practices were included for the analysis representing 10.1 % of the total General Practices in Scotland (total number of General practices in Scotland was 1021 in 2006-ISD SCOTLAND, 2006) which still is a representative sample size for all General Practices in Scotland for the comparison analysis. Most of the General Practices that took part in the audit from Scotland were situated in the high population areas of the cities of Glasgow from the west towards central Scotland along Perth and eastwards towards Edinburgh and northeast towards the cities of Dundee and Aberdeen.

The next subsection describes the crude prevalence scores for asthma from the General Practices that were included in this analysis.

4.3.2 Crude Prevalence Scores

The QOF-reported national prevalence rate for asthma has risen from 5.4% in 2004/05 and 2005/06 to 5.9% for 2009/10 and 2010/11, to 6.0% in 2011/12 and to 6.1% in 2012/13 and 2013/14. Prevalence rose to 6.3% in 2014/15 (ISD Scotland). Fig 4.1 shows the maximum and minimum crude prevalence rates of the practices that were included for the analysis.

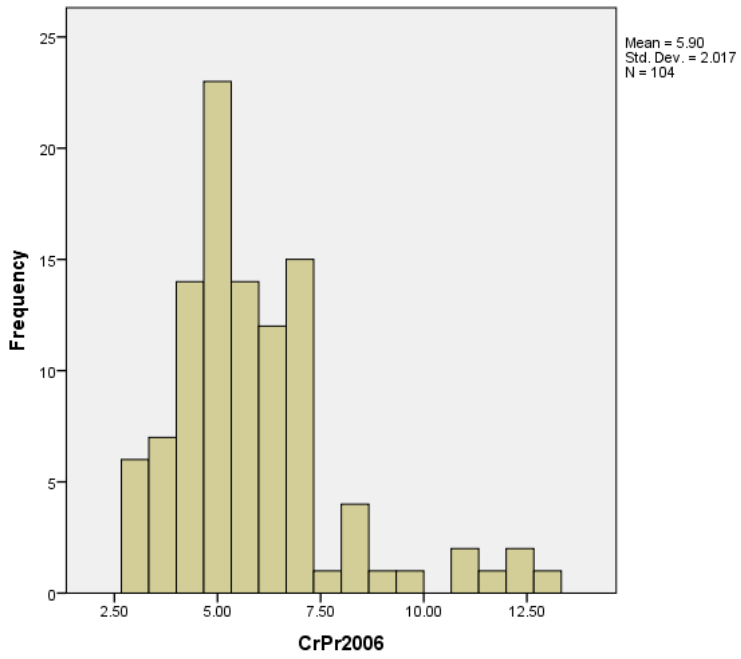


Fig 4.1 Crude Prevalence scores for the General Practices included in the analysis.

The crude prevalence rates for asthma ranged from a minimum of 2.5% to a maximum of 12.93 % from a total of 104 practices. The mean crude prevalence rate for the study cohort was 5.9 (SD 2.017) indicating that most practices in this study cohort had a high crude prevalence rate for asthma. It could be seen that a total of 51 practices had a crude prevalence rate more than 6% which suggested that a high number of practices had a sizeable population seeking treatment for asthma and only eleven practices had a crude prevalence rate of less than 4% in the whole data set.

Fig 4.2 on the next page gives an idea of the spread of the practices based on the crude prevalence rates for asthma across all the General Practices that were included in the analysis.

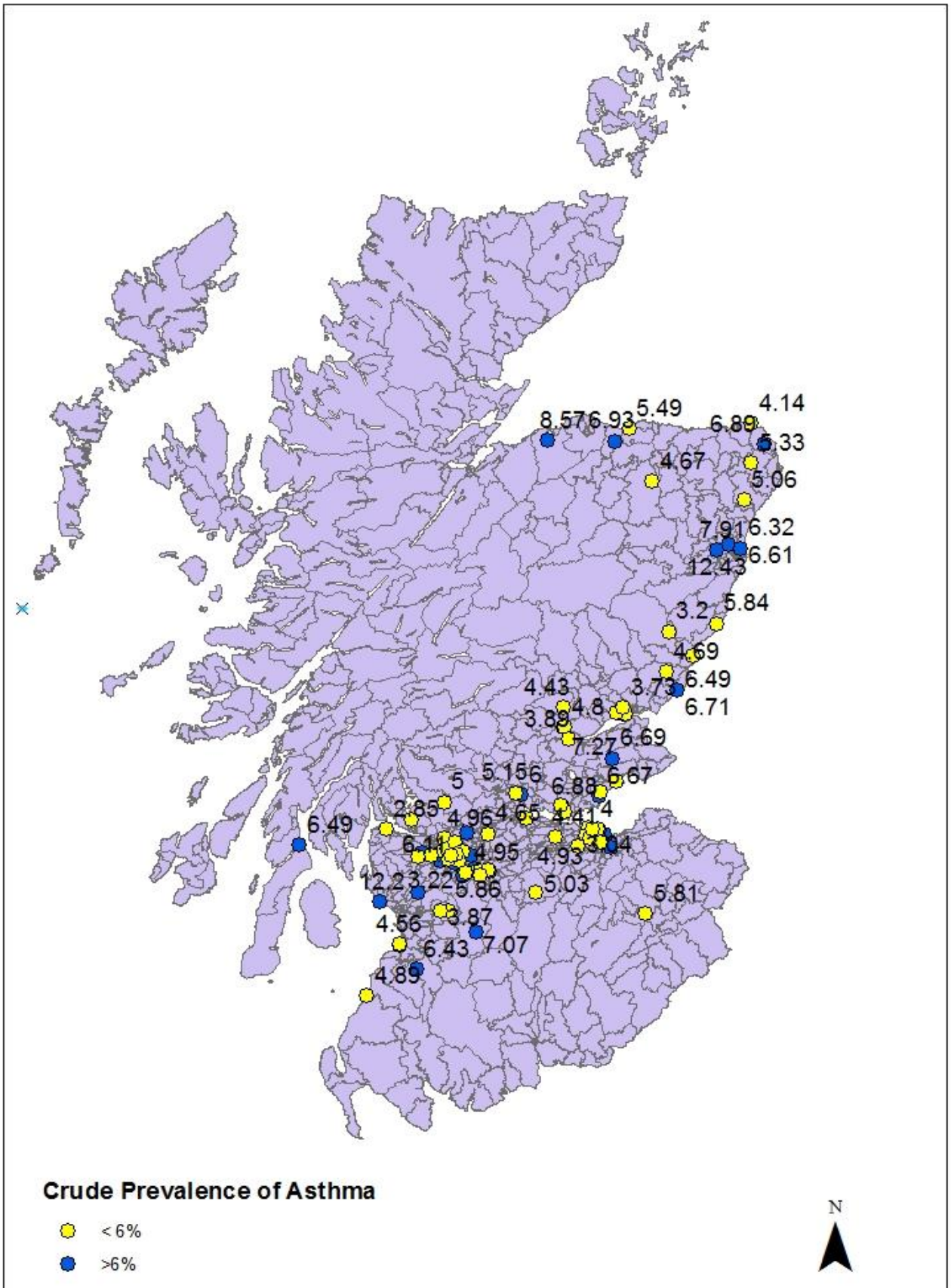


Fig 4.2 Map of the Crude Prevalence rates for asthma across all the General Practices that were included in the analysis

Most of the General Practices included in the analysis were situated in the high population areas of the cities of Glasgow from the west towards central Scotland along Perth and east wards towards Edinburgh and northeast towards the cities of Dundee and Aberdeen. General practices in the northern part of Scotland show a significant prevalence of asthma along Aberdeenshire with crude prevalence rates ranging from 8.57% in Moray to 5.33% in Aberdeenshire suggesting that even areas that are not closer to urban centres have a significant population that suffers from asthma.

The next section describes the results from the comparison analysis.

4.3.3 Results from the comparison analysis

The results from the comparison analysis is presented below in Table 4.2

	Mean asthma prevalence rates per decile			
Method of assigning deprivation to GP practice =>	*Quintiles based on overall SIMD score associated with practice postcode* ***(source A) N=104***	*Quintiles based on SIMD income domain rate associated with practice postcode* ***(source B) N=104***	*Quintiles based on % of patients in practice living in 15% most deprived data zones* ***(source C) N=104***	*Quintiles based on overall SIMD – mean practice population assigned values* ***(source D) N=104***
Most deprived quintile Q1	6.48 (n=33)	6.41 (n=33)	6.26 (n=21)	6.57 (n=24)
Q2	5.67 (n=23)	5.78 (n=30)	6.07 (n=23)	5.8 (n=21)
Q3	5.79 (n=22)	5.95 (n=16)	5.78 (n=19)	5.4 (n=19)
Q4	5.29 (n=13)	4.78 (n=13)	5.35 (n=21)	6.15 (n=17)
Least deprived Q5	5.56 (n=13)	5.87 (n=12)	5.97 (n=20)	5.47 (n=13)
Q1-Q5 (Difference)	0.92	0.54	0.29	1.10
Ratio most: least deprived	1:1.16	1:1.09	1:1.04	1:1.20
Significance test (Q1 &Q5) $p < 0.05$	0.07	0.22	0.46	0.09

Table 4.1 Results: Comparison table SIMD Deprivation X Crude Prevalence rates of asthma

Table 4.2 shows the results of the analysis comparing the mean crude prevalence scores for asthma per decile against the quintiles of the overall SIMD scores, income domain rates from the SIMD, percentage of persons living in the 15% most deprived datazones and the mean practice population deprivation scores similar to the comparison method used by McLean et al. (2008). The crude prevalence rate for each practice is calculated by dividing the total number of patients on the asthma register in each practice by the total patient population in each practice and expressed as rates per hundred people. In this analysis the mean crude prevalence rates of practices per decile was utilised for comparison.

The overall findings denote that the mean crude prevalence scores for asthma were high when compared against the deprivation rates tabulated at all the four comparison levels indicating that there is a relationship existing between crude asthma prevalence and deprivation. The row differences show that there does indeed appear to be a relationship between asthma and deprivation regardless of which deprivation measure is used.

The crude prevalence rate of asthma was seen to be consistently higher than the National Prevalence rate (6.3%, 2015) in each of the most deprived quintile (Q1) across all domains. There was not much difference between the rates of crude prevalence of asthma from the most deprived to the least deprived quintile indicating high prevalence of asthma was prevalent across all segments of the population. The highest crude mean prevalence for asthma was 6.57 in Q1 of the mean practice population deprivation domain and the lowest crude mean prevalence rate for asthma was 4.78 in Q4 of the Income domain.

It could be also seen that the difference was larger between the practice population based scores (Q1 minus Q5= 1.10) when compared against the practice postcode assigned scores (0.92, 0.54 and 0.29) which is similar to the observations by McLean et al. (2008) in their paper looking at practice postcode versus patient populations.

It was also found that after ranking these scores across each comparison domain, there were different patterns in the ranking spread compared to each domain and they were not similar. This is interesting as it may be due to the fact that this comparison utilised a different way to analyse prevalence and deprivation by assigning deprivation rates in quintiles and compared them against the mean crude prevalence scores for asthma in each decile.

It was also interesting to see that a high number of practices were located in the most deprived quintile (Q1) for the domains of SIMD (33), Income (33) and Mean Practice Population (24) indicating deprivation was a major factor in these practices that had a high mean crude prevalence for asthma. Most of these practices were located in urban areas of Glasgow, Edinburgh, Dundee and Aberdeen indicating how health inequalities is a major urban phenomenon in Scotland (Audit Scotland 2012).

The pattern of spread from a high number of practices to lower numbers across quintiles was even across the overall SIMD, Income and Mean Practice Population domains but not in the 15% most deprived domain. The percentage of people living in the 15% most deprived datazones domain had the highest number of practices in Q2 (23) than Q1 (21). The spread across each quintile in this domain ranged from a minimum of 19 practices (Q3) to a maximum of 22 practices (Q2) which may be due to the fact that asthma could be persistently present in the 15% most deprived datazones.

The income domain identifies areas where there are concentrations of individuals and families living on low incomes, and asthma prevalence was among the highest in the most deprived quintile Q1 (6.41) and through the other quintiles of Q2 (5.78), Q3 (5.95) and Q5 except Q4 (4.78). This showed asthma is a common persistent problem even in populations irrespective of income or affluence.

However, noting the differences in the rows across from Q1 –Q5 (0.92, 0.54, 0.29 and 1.10) for each domain suggests that there is a degree of sensitivity to the choice of a particular deprivation measure.

To understand the difference in crude asthma prevalence rates between the most deprived and least deprived deprivation categories, a significance test (Mann-Whitney U-test) was done. The null hypothesis was that the two groups (Q1 and Q5) used for comparison come from the same population (i.e. no statistically significant difference between the two groups), compared to the alternate hypothesis that they come from different populations (i.e. there is a statistically significant difference).The results (0.07, 0.22, 0.46, 0.09 [$p < 0.05$]) show that there is no evidence to reject the null hypothesis that there is no statistically significant difference between the two groups.

4.4 Discussion and Interpretation

The results from the analysis show there is a relationship between deprivation and crude prevalence of asthma using readily available measures of data. It is not a straightforward relationship to assess but this method is somewhat sensitive to the different ways of assigning deprivation scores to General Practices and its population. It is a limited and clear analysis drawing on a framework already utilised by McLean et

al. (2008) which looks on the relationship between deprivation and health conditions.

The analysis gives a substantive finding in its own right but it also shows how conventional approaches to managing asthma have tended to be based on construction of data at an aggregate level amidst recourse to standard measures of deprivation and standardised data. The QOF data reports only raw prevalence figures for each condition and not age-sex standardised rates. But, like McLean et al. (2008) this analysis utilised unstandardised data from the QOF and it was still possible to progress and perform a modest analysis. Even though, the crude prevalence rate of asthma was used as a comparison variable in this analysis it is important to acknowledge that this rate reflected the number of patients seeking treatment at General Practices in Scotland. McLean et al. (2008) noted that case identification rates may vary with deprivation and this may lead to QOF prevalence rates underestimating levels in more deprived areas than in more affluent areas.

This analysis used deprivation measured at an aggregate level and it is important to acknowledge that the associations identified could differ if those associations were measured at the level of individuals i.e. ecological fallacy (Piantadosi et al. 1988). But including the data based on mean practice population deprivation rates in this analysis helped to widen the lens and alleviate some of the difficulties encountered from the use of aggregated data. Deprivation and health have been shown to have both area level and individual level factors (Smith et al. 1998) and thus the use of aggregated level data may be seen as an appropriate method (Pearce 2000).

As pointed out by McLean et al. (2008), the methods used to assign practice deprivation to health data varies in Scotland and England as data on practice

population deprivation is unavailable for England but is available for Scotland (as the ISD calculates it from their GP database). In this analysis, in addition to obtaining both postcode and practice population deprivation data for Scotland, I have also drawn on additional data sources from the SIMD like the Income and percentage of people living in the 15% most deprived datazones as it helped to understand how asthma prevails in this subset of the most income deprived thus extending the scope of analysis.

Looking at some of the variation across the rates of mean crude prevalence scores for asthma across quintiles (mean crude prevalence rates, difference between the top most quintile against the bottom most quintile, ranking), the differences that existed was minimal and hence it could also be observed that these datazones may be very similar in their characteristics which could help to explain a pattern like this.

This analysis highlights that area concentrations of multiple deprivation as measured by the SIMD are important as the results have consistency with other studies that have shown an asthma-deprivation relationship. The implications for future research is that it is a simple but none the less revealing analysis which also shows how approaches to linking asthma outcomes have tended to be based on construction of data at an aggregate level amidst recourse to standard measures of deprivation. It is a limited and clear analysis drawing on a framework already done which explores on the relationship between deprivation and asthma (McLean et al. 2008) using unstandardised rates.

The results shows that area deprivation is clearly associated with crude prevalence of asthma but the relationship is complex and there is little evidence to suggest that targeting health promotion or education would improve asthma outcomes. Then, it

comes to the question of whether is it important to target practices only in deprived areas? But that is not easy, given that there are different ways in which it is possible to assign practices with deprivation rates as shown by this analysis. The methods utilised in the analysis also help to highlight in a critical way to understand crude asthma prevalence, centralized via the GP system, and that 'deprivation' as measured by the SIMD by no means reveals all about the importance of place/context, and does not provide a causal explanation for the relationship between asthma and place/context per se.

It is a complex relationship and there is a need to rethink the way in which we understand asthma beyond the prevalence-deprivation paradigm. There does not appear to be evidence for a single deprivation-asthma relationship, i.e. no singular neighbourhood effect. Rather there is a complex of possible influences that remain quite poorly understood and specified. The literature review raised a whole set of proven factors that shape asthma prevalence with deprivation the most commonly cited (Burr et al. 1997; Austin et al 2004; Basagaña & Sunyer 2004). While deprivation is a useful measure, and shows an association with asthma prevalence, it does not reflect the broad range of factors that help to determine asthma (at a range of scales, from individual behaviours to local social and physical environments), or the ways in which they interact. Deprivation also receives so much attention because it (alongside health inequalities) receives a lot of attention from governments and other organisations.

It could be seen from this analysis that crude prevalence rates and deprivation rates is only a part of the bigger picture in which asthma presented itself in the local Scottish

context. It was necessary to explore further and understand the way that health professionals (and related stakeholders) understand and respond to these factors that shape the causation and prevalence of asthma (including socio-environmental contexts), how it was implicated for the successful management as a long term condition and how this in turn shapes their management of the condition in their practice.

4.5 Conclusion

This chapter began with a description and summary of the most common deprivation indices and its relation to asthma from previous studies that was relevant to the Scottish context. An empirical analysis was done in response to Research Question 2 in this thesis and examined if deprivation (SIMD) might account for crude prevalence at Scottish general Practices at the patient and practice level. The results from the analysis revealed that deprivation (SIMD) was associated with crude prevalence of asthma. The data analysis also highlighted that the mean crude asthma prevalence rates were high and did not vary much across the different measures of the SIMD index across quintiles. Despite seeing a relationship, it also emerged out that deprivation is not the entire story even though there is so much emphasis on deprivation and management of disease from literature reviews. The contribution of the chapter for this thesis was the understanding of what a conventional deprivation measure does/does not reveal about asthma–place contexts and also helped to advance the research into the next stage.

Using the QOF crude prevalence scores is advantageous as it is routinely collected and measured in a standardised manner across the UK and provides a new way to compare against different measures e.g. ill health or quality of care. The analysis utilised both the mean practice population deprivation scores and the practice postcode deprivation scores as utilised in the study by (McLean et al. 2008) and associations seen could be attributed to the type of method utilised to compare deprivation as measured by the SIMD index and the crude prevalence rates of asthma at Scottish General Practices.

The results broadened the need to explore and understand what other factors may be operating across the social and physical environment of an area that would relate to place contexts in the prevalence and management of asthma at Scottish General Practices. Exploring perspectives from the key stakeholders in local areas involved in asthma care and management was important as they were at the heart of this context and. It was pertinent to interpret how they responded to these factors that shape the causation and management of asthma (including socio-environmental contexts); and how this in turn shapes their management of the condition in their practice. The next chapter describes the results from an in depth case study that utilised qualitative methods to reveal facets that were not captured in analysis in this chapter.

Chapter Five

Results from the Case Study Phase

5.1 Introduction

This chapter presents the results from the case study that concluded the final stage of this research. The previous chapter explored the relationship of deprivation (SIMD) to asthma crude prevalence rates at Scottish General Practices and the results from the analysis revealed that deprivation was associated with crude prevalence of asthma. The overall contribution of the previous chapter to the thesis is the understanding of what a conventional deprivation measure does/does not reveal about asthma–place contexts and also helped to advance the research into the next stage to explore the way that health professionals (and related stakeholders) understand and respond to these factors that shape the causation and prevalence of asthma (including socio-environmental contexts); and how this in turn shapes their management of the condition in their practice.

It could also be understood that despite the associations seen, the relationship between asthma and deprivation is more complex. Deprivation could be seen as a crude concept when the aspect of asthma management (which is an integral part in the context of asthma and also related to place factors) is taken into perspective. Simply understanding prevalence rates and deprivation does not bring out how much context/place could influence people's ability to manage their asthma nor give much evidence to support asthma management initiatives solely based on prevalence/area deprivation measures.

There could be a wider set of contextual place factors (ranging from the physical environmental, social and disease management factors) that were operating across the different scales of the environment in an area that had the potential to shape the asthma care and management at the primary care level (Chapter 2, Section 2.4.2).

It was necessary to explore what influence these contextual factors exerted at the local General Practice level as this was the main area where asthma management is carried out and would also give an insight into the local area contexts within which they operate. The analysis from the previous chapter looked at General Practices linked to deprivation scores based on their postcode locations (General Practice level) but also looked at the deprivation scores at the patient level utlising the Mean Practice Population deprivation scores (which are calculated using the deprivation scores of the patient's residence post code).

To understand the wider socio-environmental contexts shaping the management of asthma, a case study was undertaken to examine the convergent and divergent perceptions of various stakeholders associated directly or indirectly with the two GP practices (participant selection described next in detail and in Chapter 3, Section 3.8.3) located in two areas of different socioeconomic deprivation. This was done utlising in depth semi-structured interviews with the stakeholders.

The importance of this approach was that it was possible to understand perspectives from the stakeholders who are directly involved with the management of asthma at the General Practices e.g. the General Practitioners, Nurses, Community Health workers as they determine to a large extent how clinical management and support is carried out with the patients. The Health Board officials (Respiratory Consultant,

Environmental Public Health Specialist and Public Health Manager) and Asthma Support Groups are mainly engaged in promoting and overlooking chronic disease management programmes that are pertinent to the primary care level and their perspectives mainly reflect the dominant policy prevailing in the management of the disease. The views from the Local Council officials (Environmental Manager and Housing Officer) helped in providing a physical environmental perspective linked to asthma for the evidence gathered to this case study.

The case study responded to Research Question 3 of this thesis to explore the perceptions of stakeholders involved in asthma care on the nature and extent of socio-environmental factors that shape the management of asthma at General Practices in Scotland. The case study methods utilised are described in detail in Chapter 3 (Section 3.8 to Section 3.12).

The chapter begins with a section describing the features of the two General Practice case study areas (section 5.2) and continues on to present the *perceived opinions* of the stake holders involved, on disease management characteristics (section 5.3), the physical environmental characteristics and social environmental characteristics (section 5.4) that shapes asthma care and management.

It is important to note that the views expressed by the stakeholders in this case study is of course based upon their own experience, professional role and understanding of asthma and is interpreted along by the researcher acknowledging the subjective nature of these perceptions.

The chapter then continues to an interpretation section (section 5.5) that compares and contrasts the similarities and differences on each environmental context from the

perspectives gathered from the stakeholders from the two case study sites and concludes with a discussion on the themes (section 5.5.1) that emerged out from the case study.

The distinct contribution of this chapter to the thesis was that it gave insights on how health professionals perceived their area, patient population and how they integrated this perceptions it into their practice as their understanding or lack of understanding or their inability to act upon their understanding of the importance of the socio-environmental context was one of key factors that shapes their management of asthma.

5.2 Case study General Practices features

Understanding the features of the General Practice like practice coverage catchment area gave an insight into the characteristics of each General Practice site.

Litchfield and Vestville General Practices (names of practices have been changed) are situated in the city of Dundee which is Scotland's fourth largest city having an area of 24 square miles (Dundee City Council, 2010) and has a total population of 147,285 according to the 2011 census (ONS 2011). The table 5.1 on the next page details the General Practice characteristics of the Litchfield and Vestville Practice.

General Practice	Practice Population	Asthma Register	Crude Prevalence of Asthma	SIMD Score
Litchfield	4895	538	10.99%	54.01
Vestville	6849	242	3.73%	8.86

Table 5.1 General Practice Characteristics of Litchfield and Vestville

The Litchfield Practice is situated on the western part of the city in one of the most deprived areas in Dundee (SIMD 54.01) and has a total practice population of 4895 patients registered at the practice. There are 538 patients in the asthma register at the practice giving the crude prevalence of asthma at the practice at 10.99% according to the asthma audit dataset utilised for this research.

It was gathered from the reflections of the GP and Practice Nurse that most of the practice population of Litchfield lived in areas close to the General Practice which may indicate that they were pretty much aware of the areas from where their patients came from. The area around Litchfield is very much deprived and contains a mixture of council and tenement housing. These features are described in detail later in the chapter.

"It's quite widespread I suppose. A lot of the patients are within 1 or 2 miles but there is quite an extension of patients from even upto maybe probably 10 or so miles even can be 10 or 12 miles away so probably within 12 miles but most of them are within two or three miles" – ***GP, Litchfield***

"Yea we do have some people who are out with but majority do live locally"-***PN, Litchfield***

Vestville Practice is situated at the northern part of the city and has a practice population of 6489 with 242 patients in the asthma register thus having a crude prevalence of 3.73%.

The practice is located in an area of middle/ low deprivation (SIMD 8.86) and features better housing and amenities which is described in detail later in this chapter.

In contrast to Litchfield, the patients are more widespread across Vestville practice and they travelled long distances to reach the Practice as reflected by the GP and Practice Nurse at Vestville Practice.

"Although we are quite a mixed practice [indicating the different deprivation areas, the practice population covers] we have a lot of fairly local people which has combination of relatively affluent owner occupied but also Basport (name anonymised) out this way and that is quite relatively deprived and we have recently taken on about just over a year ago a lot of patients from the old Meadow Surgery (name anonymised) and they have got quite high pockets of deprivation"- ***GP, Vestville***

*"The practice covers Vestville and surrounding areas as well. We have got patients from Gilport (name anonymised), Depon (name anonymised) so it's all over" -****PN, Vestville***

Normally, the location of a practice is controlled to some extent by the Medical Practices Committee but there is no such control over the practice's boundaries and General Practices are allowed to set their boundaries wherever they choose with no legislative constraints (Jenkins et al.1996). During the initial conversation with the Practice Manager at Vestville to introduce the research, it was revealed that the Practice has no strict policy to accept patients only from their Practice catchment area (which was around five miles) and they also accepted patients if they stayed closer to their catchment boundaries. It could also be due to the fact that patients may have previously been staying in the areas covered by the practice and did not want to change their GP just because they had moved away and the practice made an active decision to let them stay on. Also, the GP and the Practice Nurse in Vestville acknowledged that they have a patient population who lived in different deprivation areas more recently because of the closure of the Meadow General

Practice that had been located in a high deprivation area. Since they had to absorb half of those total patients from that General Practice, it could indicate that they were also aware of the deprivation contexts that their patients came from.

Thus it can be seen that the two Practices have a broader local context when compared to each other. For a General Practice like Litchfield, it could be easier (potentially) to understand and address local contextual influences as their patients come from the immediate area. But in contrast, it would be more challenging for Vestville Practice as their patients come from a wider area that encompasses mixed deprivation contexts within the broader environmental setting. It could be understood that the GPs and Nurses in both Practices do know from where their patients come from and some of the contexts they may be exposed to. But it would also be interesting to see if this aspect is taken into account and translates into the disease management initiatives that take place at the General Practices.

The next section gives insights into how the management of asthma is carried out in these two practices.

5.3 Management of Asthma

This section will explore the different aspects involved in the management of asthma exploring the interactions and experiences of the stakeholders with the patients from general consultations to awareness of medications, medication uptake including inhaler techniques, reviews and propositions for management helping to understand the facilitators and barriers that are in play. This section will examine if the management of asthma is individually focussed and also explores whether the different contexts to which

patients are exposed to be taken into account in the management of the disease. The next subsection describes the common diseases that the stakeholders come across in Dundee and at the Practices in particular and reveals the nature of the interaction between the patients and the Practitioners or Nurse when they meet for consultations (from the perspective of the health professionals).

5.3.1 General Consultations

The respondents were queried on what were the main common diseases they had come across in their Practices and the perspectives given by the different stakeholders give a glimpse of the conditions that are present in the area.

"In this area? I suppose all the long term conditions really. Diabetes we have got probably higher than average, number of diabetics. Now that maybe because we look for them to a certain extent. We have got quite a reasonable number of COPD but then quite again we have actively looked for them for quite a few years. "- ***GP, Litchfield***

"A lot of the patients were actually mixed picture. You know Asthma, COPD. A lot of them also had psychological issues. They were on psychiatric medications. History of depression, history of comorbidity. A lot of that" – ***RN, Litchfield***

*"I would say COPD, Diabetes, CHD"-****PN , Vestville***

The diseases that were treated in these two Practices were more common with diseases that could be found in a deprived area e.g. COPD, Depression, Psychosocial issues perhaps due to drug addiction and poverty. It is also interesting to note the suggested role of psychological issues in the comorbidities patients experience as seen in Litchfield. This tallied with the findings from the literature review that highlighted a population based study by Adams et al.(2004), exploring psychological factors and asthma quality of life and the results indicated that psychological distress and decreased feelings of control are common in asthma and are significantly associated with their physical health status.

The perspectives of the Public Health Manager from the Health Board further illustrated how deprivation was playing a big role especially in Dundee in addition to the common diseases that were found to be similar with the rest of Scotland.

*"Well they are very similar to the rest of Scotland. We have all the standard respiratory diseases, coronary heart disease, key cancers, and Type 2 diabetes. In that sense we are not much different. What marks us out though from many parts of Scotland is the huge impact of deprivation on these rates. So we are similar to parts of Glasgow and Lanarkshire. It is bit more significant there but certainly Dundee after Lanarkshire and parts of Glasgow; we are probably that worse than Scotland. So the big issue for us is the impact of deprivation on our disease rates"-**PHM, HB***

Interestingly the Health Board has identified how deprivation has had an impact on the disease rates in the area and the findings are in line with an observational study that was conducted by Macleod et al. (2004) in a General Practice located in a deprived area in the East End of Glasgow exploring the prevalence of comorbidity and socioeconomic deprivation. Almost one-third of all adult patients had comorbidity and suffered from more than one chronic illness. This was common in the more deprived patients. They found out the close relationship between socioeconomic deprivation and health and evidence of the multifaceted ways in which deprived individuals are prejudiced against in terms of health. COPD which emerged as a common disease in these two Practices was probably due to the high numbers of smokers in these areas (Zaher et al. 2004; Marsh et al. 2006). But then they may also have been actively searching for these cases as a priority due to the Practice policy or to meet the QOF points targets that the NHS rewards for each practice for actively focusing management for chronic diseases that were prioritised from the NHS (Smith et al. 2008; Strong et al. 2009).

Next, the position of asthma among these diseases in the two Practices was explored.

"It has been pretty much steady I think…always has high prevalence" – ***GP, Litchfield***

"Yeah, Oh definitely on the top tier. I am sure we looked at a couple of years ago like not so much like asthma but more use of high doses of steroid inhalers and we were either at the top or second top for Dundee. On a Wednesday afternoon, there is a designated asthma clinic and we also do see patients. So yes on a daily basis and certainly through the prescription order we deal with Asthma all the time"– ***PN, Litchfield***

"From the figures it is more prevalent in children. We do have a number of adults obviously who have grown up with it. We have a few people who we diagnose in adult life but obviously not as many" - ***GP, Vestville***

"Probably in the top four or five" - ***PN, Vestville***

It could be gathered that asthma is prioritised in the Litchfield Practice and though the prevalence rate is high it has been steady over the years (as reported by the GP), despite having a dedicated an asthma clinic running on Wednesdays, they also get to see patients for asthma every day at the Practice. It was found from the literature review that the introduction of nurse run asthma clinics have had a significant role to play in the decrease in urgent GP consultations and hospital admission (Griffiths et al. 2004; British Thoracic Society 2009). The dedicated asthma clinic at Litchville must have been initiated due to demand as there is a high number of asthma patients in the Practice and to raise the awareness and decrease the burden of the disease among the Practice population. This is the opposite in the Vestville Practice where asthma comes only under the fourth or fifth position in terms of disease profile ranking which is still significant and younger children were among the most affected. At the same time it can be understood that the patient population in these two areas varies considerably in terms of practice extent, coverage and asthma prevalence (10.99% in Litchfield and 3.73% in Vestville).This is reflected next when the Practitioners and Nurses at the two

Practices were queried on whether they saw a lot of patients with asthma.

*"Yes mostly exacerbations or else the nurse would see that sort of chronic management or chronic disease management but we would see them for exacerbations…Usually we give them Prednisolone and antibiotics if they have got a chest infection as well" -**GP, Litchfield***

*"It's difficult to probably judge that because a lot of the problems with asthma are in the children and they tend not to come and see the doctor so much. A lot of their healthcare is provided by the Practice Nurse so we only tend to see them if they have got an acute exacerbation and she [Practice Nurse] is not around or if Mum's [patient's] worried about something else. So I would say actually for the Practice it's not a great workload for acute stuff "**- GP, Vestville***

The Practice Nurse sees most of the patients with asthma at the General Practice. Only in cases of emergency like exacerbations where the asthma is severe in the individual making it difficult to breathe, the GP was called into manage the patient. Due to the lesser contact time of GPs with asthma patients, it could shape the way how they understand asthma. They may see asthma as less of an issue and accept it as a low level chronic condition where the Practice Nurse is the key person in the management of chronic low level asthma which does not require their expertise other than in emergencies. It could be inferred that the focus of the GPs from the two practices were mainly in prescribing drugs and managing severe cases of asthma and they may be unaware of the wider contextual factors that may have a role to play in the patient's condition.

The GP in Vestville was forthcoming to reveal that they had more problems in managing asthma exacerbations in children only when their conditions got worse or when the parents were worried about any persistent problem in the child's asthma condition. The GPs and Practice Nurses at Vestville never had a heavy workload for asthma but this was different in Litchfield Practice which saw a steady stream of patients with asthma almost

daily. They also ran designated asthma clinic midweek because asthma was highly prevalent among their patient population which indicated that they acknowledged asthma was a prevalent community level problem. Knowing these experiences of primary contact between the patient and practitioners gave a glimpse into the general consultations taking place at the Practices.

It was also interesting to understand how asthma was prioritised in Dundee at the Health Board level and the perspective of the Public Health Manager revealed that it was not much of an issue.

"In my work, it has not specially stood out. One or two of my colleagues may disagree but in the work that I do... in our priority meetings or thinking, nothing is particularly leapt out from asthma and said we have to go for this and reduce what we are doing (referring to) Heart disease or Stroke or Respiratory disorders or whatever so it's an important area but again ...it has not leapt out I have to say.

*We have a big focus on smoking and of course asthma is part of that. So indirectly we are targeting asthma through the smoking agenda but we haven't targeted asthma per se"-**PHM, HB***

The views of the Public Health Manager gives an indication why asthma may have been a neglected disease when it is looked from a priority scale at the Health Board as there were few deaths related to asthma even though it is a lifelong chronic condition. The implications of not prioritising asthma at the Health Board level may affect how the disease is targeted at the General Practice level especially by the GPs and Practice Nurses. It was also interesting to note how asthma was 'folded into' smoking, a condition understood as determined by individual behaviours by the Health Board. There is a need to consider asthma alongside other diseases and recognise how comorbidity as understood by the other diseases that were commonly present in these areas could also lead to noncompliance and fatalistic views of ill health.

This subsection highlighted how asthma is prioritised by the Health Board and to some extent by the General Practitioners due to different reasons based on their own experience and understanding. This may be due to the fact that it is the Practice Nurses who deal with the everyday management of asthma and are the ones who engage with the challenges of individual behaviour and local contextual factors. It could be also seen that comorbidity is an important factor to consider in asthma management especially where conditions like COPD, heart disease, cancer get more attention and coexist in patients with asthma.

The next sub section looks closely at the medication awareness, uptake and inhaler techniques which forms a major part of the management of the disease from a clinical perspective.

532 Awareness of medications, medication uptake and inhaler technique

The narratives from the previous subsection showed that GPs tend to focus mainly on clinical treatment outcomes via prescribing medications and this is reflected to a smaller extent in the Practice Nurses in their approach to asthma management. This illustrates how the management of asthma is individually focussed which, this research argues, is a limited way of understanding the problem asthma.

Trying to know how much patients are aware of their medications is key to asthma management (Laforest et al. 2007). Lack of awareness about their medications and poor inhaler technique among patients invariably links directly to poor medication uptake (Gillissen 2007). Patients with asthma normally have reliever inhalers that immediately decrease asthma symptoms, preventer inhalers that control the swelling

and inflammation in the airways (passages to the lungs). This stops them from being sensitive thereby reducing the risk of severe attacks and when the asthma becomes severe, they use steroid tablets to decrease inflammation. It was necessary to explore how health professionals perceive patient understanding of their medications at the two practices.

"A lot of them were not aware really that taking their correct medications obviously their prophylactic or their long acting bronchodilator [medicine that dilates the air passages to make breathing easier]. A lot of them were unaware because a lot of them were poor attenders and so hadn't been into the clinic for a long time. They did not really understand what their inhalers were doing or how they should take them and often their technique was absolutely awful. So they were just zapping their throats basically"

But they were also not aware of what asthma is and that is something I took time to explain and that is where I use my little pictures [about lungs and how asthma blocks airways] and show them where each inhaler works and why just zapping away on their Ventolin [Inhaler] didn't work over there or feel better" ***–RSPN, Litchfield***

"*I don't think they are that interested. It's like they are interested when they feel unwell when they are wheezy and tight and they have to use their blue inhaler all the time. They are interested and so they come in and we go over everything again and that is great and then five or six months down the line [Pauses…Sighs with sadness] they just stop"* **- *PN, Vestville***

Patients apparent complacency about their medications may be related to their lack of awareness about asthma and its management (Canonica et al.2007). It was evident from the opinions of the Respiratory Nurse and Practice Nurses that most of the patients in both the Practices were seemingly not aware of their medications nor showed the will to understand them despite the efforts from the Nurses. It could be challenging for the proper management of the disease if a sense of complacency started to exist in the Nurses too if they knew that their efforts were going to be in vain.

The Nurses suggested that the patients were not using their inhalers properly. One of

the biggest changes in asthma management has been the transition from oral to inhaled therapies as the preferred route of administration and this has been in use for the past twenty five years (Hilton 1990). An audit of inhaler technique among asthma patients of 34 General Practitioners confirmed that technique is unsatisfactory for a significant proportion of patients, regardless of the device used like inhalers or spacers (Hilton 1990).

Lack of attendance for reviews is another factor that was brought up by the nurses and described in detail later in this subsection. The Nurses associate the patients lack of responsibility with poor asthma outcomes with the 'locus of control concept' postulated by Rotter (1966) where individuals should see themselves as responsible and in control of their health and illness conditions. It is also interesting to note that there was no mention of individual's ability to make healthy decisions in these areas. These points were reflected in the perspectives from the practitioners who were queried on compliance to medications and inhaler technique as seen below.

"We often find the compliance with their steroid inhaler was poor. They use their blue inhalers and forget about the brown ones... and then their inhaler technique is not very good often as well. So we have to try and sort of make sure that they use their spacer [add on device with a mouth piece and attachment used to administer aerosolised medications via metered doses] because it's much easier to use and so on." ***-GP, Litchfield***

*"Very, Very poor compliance in concordance with the prescribed medication because they did not understand .You know a lot hadn't had the time spend on them because they did not come to the clinic.You know you give them written information but because on good days they feel good, they don't take their inhaler. So it's very... very difficult to get people with asthma to continue to use an inhaled steroid when they feel well" -**RSPN, Litchfield***

*"I think their technique is pretty awful generally. The Practice Nurse does her best. We speak to people. Certainly people. Adults don't want to use spacers they have...You can talk to them but they are actually sure of if they use the MDI's [metered dose inhaler] it gets down there...It works. So, yea it is difficult" - **GP, Vestville***

'It doesn't matter the age group. Although I do find that older age group will comply

*better than like middle aged and younger" -**PN, Vestville***

The Practitioners and Nurses from both Practices were of the opinion that the patients had poor medication uptake and inhaler techniques despite their best efforts to provide advice and guidance. It could be partly attributed to poor attendance and difficulty in understanding their medications at the Litchfield Practice; and poor compliance and insistence on preference to higher strength medication to ease their asthma at Vestville Practice. This is similar to the evidence gathered from the literature review which found that patients continue to underuse preventer medications and overuse reliever medications (Lozano et al. 2003; Bosley et al. 1995).

In a study conducted by Finkelstein et al.(2002), the results denoted that the underuse of controller medication was a factor contributing to medication non-compliance and Molimard et al. (2008) highlighted that patient related factors including smoking, poor compliance and critical errors in device manipulation, have significant negative impact on asthma control. This could be addressed by patient education. Bosley et al. (1995) indicated that non-compliance is associated with a complex mix of psychosocial factors, social context and place factors which would be important to consider at the two Practices.

The GPs and Nurses were very critical of their patients as they focussed mainly on compliance to medications which is a very medicalised understanding of asthma management. The difficulty and despair reflected by the Practitioners and Nurses to teach patients about the basic medications they had to use suggested the struggle they had to endure to get their message across and may impact on their attitudes to asthma management more broadly.

The asthma support group stakeholders are aware of these inherent problems and work hard to mitigate these factors but there are other inherent actors also present as understood from their perspectives below.

*"I think medical care is pretty good across the Health Board but I think the greatest problem is the lack of awareness of what asthma is, the condition, the impact it can have on society but also how to use their inhalers. I find that is what the major barriers and that is what people with asthma tell us quite a lot"-**ASG 1***

" ...I think perhaps a perfect inhaler technique... because inhaler technique seems to be a "Bermuda Triangle". Not only for patients but for clinicians as well. And it seems to be absolutely essential for people to go on for refresher courses. And I don't know why it's so particular for inhaler technique but it seems to be the one thing that is so susceptible to skill fade"

*"That [inhaler technique]is a huge thing for us because it is absolutely our experience that many healthcare professionals do not have appropriate inhaler technique and even more patients with inhalers do not have appropriate inhaler technique or are not using their medicine appropriately." -**ASG2***

The perspectives from the official from ASG2 again illustrated the focus on inhaler technique and medications as the clinical solution for asthma. The opinion of the official that the healthcare professionals also lacked the proper technique to impart to their patients must be due to the fact that GPs had less contact with their patients or the GPs and Nurses were complacent in their attitudes towards asthma management as noted earlier due to the lack of cooperation from the patients. Inhaler technique education is important both for the practitioners, patients and is recognised by the Health Board as the perspectives from the Respiratory Consultant at the Health Board level gave more insights into this.

"I am involved in a National Group and I think that I have done a bit of work. I think that inhaler technique is the fundamental component of airways care -asthma and COPD. And again I think a lot of money so spent by the Board on drugs when it's not quite clear whether the delivery of the drug whichever one it is effective. If you get the inhaler from the Nurse or the Doctor and then you go to the Pharmacist. You have already had a

demonstration from the Doctor or the Nurse and then you go to the Pharmacist and he or she checks it but again it's difficult for the people.

*We are trying to do a lot of work to get education ,get every clinician to say before you change your medicine ,certainly the strength or add another one, can the patient use the medicine they have got? But there is an issue of the understanding of the person prescribing whether they can actually use or demonstrate the medicine and that is one of the things we are trying to work on. I don't think a lot of people appreciate how poor the lung deposition is with standard inhalers and how important demonstration and teaching of technique is" -**RSPCON, HB***

The primary focus of the Health Board has been on the clinical management of asthma through medications but there are considerable gaps in this approach which need to be addressed. It could be understood from the perspectives of the Respiratory Consultant that again importance was on inhaler technique. Though the patient may be getting inhaler technique education from the time of consultation or review by the GP/Nurse and reinforced by the Pharmacist, factors like patient literacy, interest in improving their own condition and practitioner's knowledge of inhaler technique plays a part (Duerden et al. 2001; Hilton 1990). The Respiratory Consultant does acknowledge the limitations on the role of medicines in tackling asthma mainly and its use is highly variable among patients but it needs to be seen if these are addressed properly at the General Practice level. Imparting proper inhaler technique training to patients is their ability to attend periodic asthma reviews where this can be reinforced and the understanding how asthma reviews play a factor is explored next.

533 Asthma Reviews

An asthma review is a periodic assessment of an individual with asthma by the practitioner on the overall wellbeing and improvement of the condition with medication and management. The reviews help in reassessing if there were any changes needed in medication dosage, overall asthma condition and also help in

building and reinforcing a good practitioner–patient relationship which would be beneficial in the overall outcome of the disease. In a study by J.D van Baar et al.(2006) to understand the reasons for asthma outpatient non-attendance for reviews found that patients realised asthma assessments offered the opportunity to better understand and control their asthma; discuss important recent personal developments; have relevant tests performed (for example, lung function tests); obtain prescribed treatment; and obtain reassurance. An additional important motivation for attending the follow up appointment was the desire to keep up to date with recent therapeutic advances. It was necessary to understand what factors were influencing reviews at the two General Practices. Asked if patients were regular in their follow-up reviews, the Practice Nurse at Litchfield commented in the negative.

*"No they are not brilliant. I would say that is one of the things to deal with in a deprived area as well. Problem is getting them to attend and the ones that don't attend are the people we will need to see the most .They will never attend when they are unwell and they go away, they get their steroids, get their inhalers and we don't see them until they are unwell again and unfortunately we are not really getting to the bottom" -**PN, Litchfield***

The evidence from the literature review highlighted that good practice organisation, specifically longer consultations and seeing the same clinician are linked with an increase in participatory care (Adams et al. 2001) which was not the case at the Litchfield Practice as the patients were not regular in their reviews. Consultation style and the quality of provider- patient communication can impact on patient satisfaction and health related outcome (Adams et al. 2001; Stewart, 1995).The Practice Nurse noted that this was one factor to deal in a deprived area acknowledging that context had an important role when it came to patients attendance for reviews as preventative work was not possible, as patients only came to the Practice when they were ill. The phrase 'we are not really

getting to the bottom [of it]' suggests that the Practice Nurse knows there are underlying (personal and social) problems, but current asthma management arrangements can't understand and address them.

The GP at Vestville Practice noted that attendance for at asthma clinics was the most problematic amongst chronic conditions services:

"When patients are well they generally don't want to come in. We push it for diabetic reviews and hypertension reviews but I think the poorest of all the chronic disease clinics attendance, the poorest attendance is probably would be at the asthma .Only helped by the fact that the Practice Nurse does chase people up but it's the one that people tend not to turn upto"

*"The adults are probably less well looked after because they tend to default clinic appointments. Even if they don't come regularly a lot of parents will bring their children from time to time but a lot of the adults kind of fall by the way side for review and then suddenly come to light when they have a problem" -**GP, Vestville***

It is interesting to note that the GP at Vestville was of the opinion that asthma was mostly seen as a condition in children as the parents were regular to bring their children for reviews but there was less interest among adults to attend reviews. Asthma gets less attention and value as a condition by the GP as the focus is more on diseases like diabetes and hypertension probably due to the incentives offered by the QOF from Health Board (Strong et al. 2009). It is known in primary care that up to two thirds of patients with asthma do not attend for their annual assessment, perhaps because patients believe that their asthma is so mild that the relative inconvenience of attending outweighs the possible advantages of an asthma review (Gruffydd-Jones et al.1999). The Practice Nurse revealed more on this aspect:

"I would probably say 80%. I think so. I do think the majority of the people do come. Children, I tend to see six monthly more often if they are poorly controlled. It would be three monthly if they are poorly controlled and it's the same with adults but rather than calling adults in for review, they will be on annual review and I say to them if you are having any problems, please come in before your annual review because what I do find is that their annual reviews, they are quite good at coming in for. But if you call them in

*three monthly or six monthly they tend to ignore it but they will come in once a year so if you just say to them if you come in if you are having any problems that is what they tend to do " -**PN, Vestville***

The Practice Nurse's reflection tally with the findings from the study by Gruffydd-Jones et al. (1999) as the patients may not be seeing it asthma as a condition that needs regular reviews and felt they were managing well within themselves.

Thus, it can be seen that compared to Litchfield Practice, there is a good percentage of patients who attend their annual reviews in the Vestville Practice though asthma ranks poor in attendance compared to review clinics for other diseases. Asthma reviews, it has been found, are often not standardised in structure and data collection, are not comprehensive, fail to address the needs and expectations of patients, are ineffective at reducing morbidity and mortality, and are poorly attended (Horne et al.2007). The Practice Nurse at Litchfield noted that this was common in deprived areas acknowledging one aspect of the social contexts in play and perhaps patients had an outlook that these reviews had limited value for their condition.

In a study by van Baar et al. (2006) to understand reasons for asthma outpatient non-attendance it was found that memory lapses, poor health, and disillusionment with the structure of outpatient care were important factors implicated in non-attendance. At the Practitioner level, it can transcend into the attitudes of the GPs and Nurses who are exasperated that the patients don't take their condition seriously and only attend when they have a problem. The patients may not be seeing asthma as a condition that requires regular support in the form of reviews and which needs to be managed on an everyday basis. This undermines the whole approach of self-management in these case study areas and this aspect was explored in the next subsection to understand how

patients were managing their own condition overall.

534 Self-management Support

Self-management is a subset in the management of asthma where the patient is in charge of taking care of their condition noting down the signs and symptoms for an imminent asthma exacerbation by following a care plan devised by the Respiratory or Practice Nurse. There are two types of plans imparted to the patient in the form of written or verbal plans. (A separate literature review on the factors influencing the management of asthma was done in Chapter 2, Section 2.5.2.3.3 where self-management is covered and so it is not discussed in detail here).

It can be seen that self-management is a wider trend in the "individualisation"[1] of healthcare (Barlow et al. 2002; Segal, 1998), which is partly due to a rise in chronic illnesses (asthma, COPD, diabetes, heart disease, arthritis) and the additional demands placed on healthcare services. It also empowers people how to look after themselves to enhance their wellbeing (Nettleton 2006).

The literature review highlighted the benefits of utilising symptom based action plans in a number of studies and their use in primary care (Beasley et al. 1989; Charlton et al. 1990; G Hoskins et al. 1996; Glasgow et al. 2003; Gibson, 2004; Wolf et al. 2008).It was noted that patients who use an action plan can reduce their hospital admissions and urgent consultations with a GP, experience fewer 'days off' due to asthma symptoms and suffer less night time symptoms (Caress et al. 2002).Linking action plan use and self-management education with regular review empowers

[1] Denford et al, 2014 described 'indvidualisation' as a way of minimising the negative impact of burdensome medication regimes by involving the patient, right from the initial decisions regarding the pharmacological management of their conditions. The health practitioner negotiates with the patient considering the patient's individual needs, lifestyle, coexisting conditions and also involve them in the ongoing monitoring and adjustment of doses.

patients to take control of their own asthma, increasing their confidence and better adherence with medication (Robertson et al., 1997).

It was also possible to deduce some of the barriers that existed in the application of self-management plans like underutilisation of these plans by health professionals (Hoskins et al. 2005; Wiener-Ogilvie et al. 2008), under use of plans by patients (Gibson, 2004; Wiener-Ogilvie et al. 2007; Tse et al. 1991) and failure to update the plans on a regular basis when given to the patient (Barton et al. 2005), inadequate literacy among patients (Williams et al.1998), health behaviours and beliefs like smoking, diet etc. which shape the success of management of a disease (King et al. 2003).It was also seen that depression, weight problems, difficulty exercising, fatigue, poor physician communication, low family support, pain, and financial problems were the most frequently noted barriers to active self-management in a study by Jerant et al. (2005).Thus, there is evidence to support that it works for some people but not for many others – i.e. the contexts within which people live are very significant in the success or failure of self- management.

To get insights into how self- management care plans were utilised and beneficial, the interviews explored the perceptions of the stakeholders on the uptake, types, strengths and weaknesses of these plans. Actions plans can be given in the written format or orally depending on what seems appropriate as decided by the health practitioner. The Practice Nurses were queried on the type of plans they preferred to give and their narratives revealed that they were biased towards giving out oral pans citing lack of time as one of the factors.

"I quite like written ones [plans]. I probably give more verbally purely because of time. I tend to find if you spend a bit of your twenty minutes writing the management plan quite

*often I find them in the car park beside the car or I find them lying in the waiting room and I do sometimes think to myself how do I use my time appropriately. I think if I had another ten minutes for every patient, I would give everyone a written one" -**PN, Litchfield***

Written action plans are linked to improved patient outcomes and if used can facilitate improved patient self-management of asthma (Gibson et al. 2003).The reflections and experience of the Nurse at Litchfield could be based on her own experience and perceptions that patients do not value these plans seriously and may discard or forget them and go back to their old habits. If verbal plans were issued, they were able to impart some information even if the person was not literate enough to read. The Practice Nurse at Vestville Practice echoed similar perceptions:

"I do a bit of both. I always do it verbally. I go over what to do in emergencies and what not and sometimes the care plans like the ones you print out or the little booklets, they are not detailed enough for the patient so I will just get a bit of paper and I will write it down step by step for the patients that I feel who need that extra little bit or they will bring their inhalers in and I will write down on the box exactly what to do.

What I find is that for asthma I have got to admit I don't do them as regularly as they should but I do them regularly for the COPD patients and I ask to bring it with them at each consultation and they just put it away in their drawer and maybe one person in a hundred will remember to bring it in.

*Again it's like their inhalers, when they feel well they are not interested, they put it at the back of their drawer and they won't keep it in front of them" -**PN, Vestville***

Self-management action plans are easier to be given verbally than written ones. Imparting verbal plans may help patients who are active in utilising self-management making it more effective. Though the Nurses are stressed for time, it is not easy to pass on information in a written plan which is what the asthma guidelines from British Thoracic Society and Asthma UK suggest (British Thoracic Society, 2012; Asthma UK 2013).The Practice Nurse in Vestville was of the opinion that it was easier to write simpler messages on a piece of paper than an official action plan card as they were

most often likely to forget bringing their previous plan with them for a review. A point to be noted is that the Vestville Practice does not have high asthma prevalence as compared to the Litchfield Practice and the patient population comprised of those from affluent and deprived backgrounds. Even then, it could be understood that there was no difference in the uptake of self-management irrespective of the contexts the patients came from in the two Practices. The Nurses also opined that the patients showed a general disinterest to sit and understand their plans which reflected in their attitude to the condition itself which makes the effectiveness of self-management highly variable.

Lack of time was an important factor cited by the Practice Nurses that emerged as a barrier preventing them from giving written self–management plans depending on the patient but they have not been too strict with it. The specialised Respiratory Nurse at Litchfield Practice reflected:

"It depends on the patient and I think it is something you dread... at least for some of the nurses...and when I was in practice I hated giving self-management plans because they took such a lot of time. You cannot do a self-management plan unless the patient understands their condition.

As noted earlier self-management forms a part in the wider management of asthma empowering the individual to take care of his own condition. The Respiratory Nurse's apprehension could be due to a variety of reasons i.e. the patients won't respond well to the plan or is it just the time spent on filling out a plan when it could be given out verbally? The Respiratory Nurse reflected further on this:

What I used to maintain was you cannot really give a patient an action plan until you have got them reasonably well managed. So you have got them understanding their condition, you have got them stable by increasing their inhaler steroid or getting them to use their inhaler steroid or whatever, then you bring them back possibly in a month and

*then you say right peak flow [breathing measured in lung volumes] is better" -**RSPN, Litchfield***

These reflections revealed that it would have also been difficult to get a patient back for a review to give self-management education as their condition would have been

better and the patient might have felt that it was not necessary for further management of their condition through self-management or be prepared and ready for such a plan. The use of the phrase 'got them reasonably well managed' seems to suggest that GPs and PNs see the need to control or 'get a grip' of their asthma patients to enable them to self-manage, i.e. get them onto the right track, having the right attitudes, adopting the right behaviours but would be difficult if the patient was living in difficult contexts or had a chaotic life. Research has shown that patients in deprived areas are less likely than patients in affluent areas to wish to have an active role in decisions concerning their care (McKinstry 2000) partly due to their difficult contexts or state of mind. This highlighted the limited effect that Nurses could have on people's health even in difficult social contexts which brought into perspective whether the Practitioners really considered the self-management plans beneficial?

*"If the patient is well educated and well-motivated, yes but all of them here are the opposite. So that is difficult. I think the better educated ones probably do..Others find it difficult" -**GP, Litchfield***

Education is seen to be important as it can be seen as a proxy for an appreciation of the role of medicine and taking responsibility (Williams et al. 1998).The reflections of the GP at Litchfield suggested that education level and to some extent the type of deprivation seen in those parts may determine the appropriateness of self-

management. It would be interesting to understand the impact and usefulness of self-management plans for asthma in deprived areas if the Practitioners and Nurses felt they were not useful**.** The Community Health Nurse at Litchfield observed:

"In my opinion I don't think… [sighs] I don't think they are useful. I think for the clients that we work with have limited understanding of really complex issues in their lives that if you give them something like that and they will just lose it and they won't follow it. I think lots of people have difficulty reading and writing. Lots of people have literacy problems. That is a big issue…and their understanding and I think if you make it too complex for them. They maybe nod and nod and say 'Yeah, Yeah I understand' and they would go away quite often and maybe come to us 'cuz they have not understood it"– ***CHN, Litchfield***

It is important to note that the Community Nurse spent lots of hours with patients during the smoking cessation groups she ran and her perceptions may have arisen from the longer time she spent with them. These experiences may have shaped her acknowledgement of the importance of how context comes into play being aware of the complex issues that the patients in Litchfield might have and how they had problems with literacy. Challenges like illiteracy, poverty, unemployment may make patients feel that managing their asthma management was not important. If self-management plans are not simple to understand they are not serving the purpose. In fact this is not an issue when it was highlighted to the asthma support group official whose organisation promotes one of these plans.

*"I think the person themselves should need to take ownership of their self-management a lot against other conditions. I think that the self-management of asthma should need to be looked at a lot closer because it's quite simple compared to other conditions. What people needs to do is have their personal action plans which we promote both our own or the ones the health board promote" -****ASG1***

It is surprising to note that the official from ASG1 considers self-management plans for asthma to be simple and easy for an individual to adopt. There seems to be a disconnect from reality seen from his perspective as it is not evident that a one size fits

all approach would be beneficial in these circumstances and may have been bought into the self-management approach promoted by the Health Boards. The Health Board though recognises some of these inherent problems but have not yet found a solution that could circumvent this as understood from the Respiratory Consultant at the Managed Clinical Networks.

"We promote the use of Asthma UK self-management plans. They are fairly simple and easy to complete but given the time restraint that most nurses and doctors work on, I think people find it difficult to complete them" – ***RSPCON, HB***

The use of action plans in the self-management of asthma may enhance clinical–patient relationships in the management of asthma by initiating discussions between the patient and practitioner, taking medications as prescribed and own a peak flow meter (measures lung volumes) to monitor their asthma (Patel et al.2012).Though the respiratory consultant acknowledges these factors he is also aware that it may not be the reality especially in the context observed in the case study areas. It was interesting to understand the perspectives of asthma support groups as one of these groups (ASG1) were active in promoting their own asthma action plan.

*"We have done a lot of work on it.I don't think they need to be improved in terms of the content. Getting people to use them is more important."-****ASG1***

It could be understood from the perspectives of ASG1 who promote their own action plans with the Health Board that there was a disconnect existing with the ground reality of what was happening at the Practice level especially the problems Practice Nurses are presented with; related to time (rather lack of it), feasibility and patient involvement when they try to give action plans. The Nurses preferred simpler plans but it was interesting to note ASG1 opined that the problem was more at the patient level in terms of self-management usage. The above quote also suggests that there is a

recognition that however much information you give to people the way this is interpreted, and acted upon (or not), is a whole other matter – so who people are and the contexts in which they live is often the deciding factor. The reflections of the official from ASG2 were more pragmatic illustrating his awareness of the inherent problems.

*"I think the NHS has a very paternalistic approach to healthcare or patients sometimes prefer it to be paternalistic. The other component is the time scales delivery of a self-management plan and appropriate and helpful discussion and agreement of that takes time and there are other priorities during an asthma consultation in terms of dealing with an acute problem or perhaps dealing with issues in relation to inhaler device or are the medicines working, side effects of the medicines" -**ASG2***

Quite contrary to the perspectives of the official from ASG1, ASG2 articulated the focus of consultation is on inhaler technique, rather than on 'helpful discussion and agreement' (i.e. building relationships – which take time). Despite being aware of the inherent factors that may influence the uptake of self-management plans he implied that the Health Boards and sometimes the patients preferred a "paternalistic approach". This maybe because some patients expect to be strongly directed in their care or that self-responsibility may not work for some patients but this approach may also ignore the powerful contextual factors present. A one directional approach from the Health Boards to the patients in terms of service delivery would offer no recourse for retrospection from both sides as it may not succeed in challenging contexts. This was clearly apparent in the previous perspective offered by ASG1 who also work as mediators between the Health Board to the patients providing support initiatives in adoption of self-management plans and advice.

This sub section in the management of asthma brought out the inherent problems existing in the adoption and implementation of self-management plans especially in

the two case study areas. Improvements to the management of asthma including self-management plans can be a way forward. How feasible it would be to succeed depends on the prerogative of both the practitioner and patient. Additional time during consultation with the Nurse and patient education is essential as inhaler technique and medication awareness can also be imparted to. But illiteracy in the patient can be a major hurdle. Low health literacy is common, especially among those with low socioeconomic status, the elderly, and those whose primary language is not English, reflecting limited educational opportunities. Health literacy is defined as "the degree to which individuals have the capacity to obtain, process, and understand basic health information and services needed to make appropriate health decisions" (Baker 2006). The severity and complexity of asthma tends to be high in these same patients. One theory explaining poor asthma outcomes among disadvantaged patients is that health literacy affects their ability to manage one or more health problems like asthma (Apter et al.2013). So it is important to acknowledge and take into account the importance of other community level contextual factors like literacy especially health literacy in addition to the deprivation seen.

Patient personal characteristics (including self-management plan use, inhaler technique, medication compliance) are shaped by contextual factors which are in some ways known to health professionals but not addressed properly or even ignored (as seen by the official from ASG1) e.g. place factors like institutional factors or socioeconomic and cultural characteristics which are looked into later in this chapter in section 5.3.6 and section 5.4 respectively. By not having self-management plans, patients were less likely to initiate discussions with their physician, own a peak flow meter to monitor their asthma, use their medications as prescribed, all considered

important self-management behaviours (Hoskins et al.2012). These factors appear to predominantly influence the complex nature in the disease management context. This brings into perspective the support structures present for asthma management which was explored next.

535 Support Structures and Cooperation

The support structures in place that shape the management of asthma at General Practices directly or indirectly was explored to understand the connections between the different stake holders involved in asthma care and management. For example, the support initiatives between the asthma support groups and the individual with asthma seeking treatment at the General Practice and the cooperation between the Health Board and General Practice.

The main support groups for asthma in the United Kingdom are ASG1 (name anonymised) and ASG2 (name anonymised) who are endorsed by the NHS. ASG1 is the largest asthma support group in the UK and to a lesser extent ASG2 whose primary focus is on COPD, but has priorities developed for asthma too. They have a national presence in the main cities of the UK but do not have a local presence, e.g. in a city like Dundee. It was important to understand what work they were doing and at what level of health care they were operating at, to interpret their contribution in the context of asthma management in the UK. ASG1 gave insights into their organisation and local presence in Scotland.

*"We are a small Charity as you can see and in Scotland we don't have so many offices. We are based in Edinburgh in Scotland and we do a fair bit of travelling around the country .We work with the Managed Clinical Networks [MCNs] and Health Board. We provide support over our helpline not pertaining to clinical support" -**ASG1***

At the support group level, it could be understood that ASG1 provides services via their helpline and website for asthma information but liaise well at the Health Board level though they have no direct contact with the General Practices. These close ties with the Health Board are reflected in the dominant discourse around asthma self-management highlighted in the previous subsection. These perspectives were also common with ASG2 and were explained by their official.

"*We have to deal at quite a high level simply because as an organisation we are tiny. You have almost met my entire team today. So we have to position our activity at a level which can actually make a difference. So to give you a sense of where we are, Chest Heart and Stroke Scotland have the same level of income as the ASG2 does across all over the UK. The British Heart Foundation is about 50 times wealthier than we are so I would love to have adverts running on National TV .I would love to have sufficiently swamp Scotland with relevant materials but we cannot operate at that kind of scale or that kind of level so it's very much a focus on engaging at senior level with Government ministers, Government officials, The Respiratory MCN's have been an absolute God send because it is within the local health board area"- **ASG2***

It could be seen that the ASG2 has direct clinical contact with the MCNs but they were not involved at the primary care level because they had decided to position themselves at the higher Health Board levels for decision making. This disconnect from the primary care level (and so from local contexts) was evident in the earlier response from the official of ASG1 when queried about the advantages and disadvantages of self-management plans, for which the response was there was nothing wrong with the plans and it was the duty of each patient to understand their plan and follow it.

Asthma does not get enough attention in society compared to heart disease, cancer etc. and there is a common understanding that it is an individual illness feeding down from the Health Board to the GPs and Nurses in the form of management initiatives (including self-management) and among people with asthma.

Positive asthma outcomes are associated with specific programme characteristics: being community centred, clinically connected, and continuously collaborative. Programme developers and implementers who build these characteristics into their interventions will be more likely to realise desired asthma outcomes (Clark et al.2009) as cooperation across different levels between the stakeholders involved is also key for the successful management of the disease. How do these fare between the different stakeholders was explored by the Researcher. First the General Practices were looked into and queried if they liaise with support groups like ASG1 and ASG2.

*"We do. I find the ASG1 online stuff really good but again we have a whole population that don't really have sort of online access. But certainly we promote that. We use ASG1 (online content) for things and resources as well" -**PN, Litchfield***

From the Practice Nurse's perspective at Litchfield, they were aware of the information from ASG1 online was helpful but raised a valid point whether this information was beneficial for patients from deprived areas who had literacy issues and access to information as they already had more problems to face in their daily lives. The researcher explored this aspect further querying about smoking cessation groups among patients run by the Community Health Nurses in the Litchfield Practice. The Practice Nurse's narrative revealed some disconnect existing here.

*"They [patients] are told about it [smoking cessation groups] but their attendance rates? I don't know definite figures but certainly the last time I spoke to them and in the local pharmacies, they aren't great" -**PN, Litchfield***

The Litchfield General Practice shared space between the General Practice staff and the Community Health Nurses. It was necessary to explore their level of interaction in terms of engagement and promotion of programmes between them. The Community health nurse at the Litchfield Practice was more sceptical about this:

"We are separate from the GP practice. We are not attached to the GP practice at all. I mean I do go in regularly and see them .They know we run groups here. I have not been there for a long time now .I used to go in quite a long time regularly just telling them we are running this but ...(Sighs in despair at the lack of cooperation).

*I don't think they know what we do actually because we are not attached to the GP practice, we are not part of the surgery but I do...I have made a point to meet them .I used to go in every few months but I have not gone in for a long time because I think there is a lit bit of apathy I could say...[On you go then...Good Luck]. So I am disappointed that I have not carried out my job but that is a shame."- **CHN, Litchfield***

The level of cooperation between the General Practitioners or Nurses with the Community Health Nurse at the Litchfield General Practice was not really fruitful even though they shared an office in the same building. The Community Health Nurse could have formed her perceptions that the GPs and Nurses were not really supportive in collaborating with them, perhaps because they were not employed by the Practice or because they were really not really keen to collaborate and work synergistically. There seemed to exist a divide between clinical (individualised) and support (community level) types of engagement. It was apparent that for a proper understanding of contextual level factors existing among the patients of the practice, the inputs of the Community Health Nurses would be very beneficial because of their longer engagement with patients and work in the communities bringing out the importance of building relationships.

Within the asthma support groups, the level of cooperation is well maintained with the Health Boards and they act as a go between the clinicians and the higher officials at the Health Board.

*"I would say it is pretty strong and I think we have a good relationship with all the NHS boards"-**ASG1***

As an organisation, I think the most important role is to be a catalyst for that kind of best practice and the other role that we play as well is that we can ask the questions that clinicians cannot ask because of the contractual obligations and limitations. So if there is a problem in a service in a local area it will probably be from this office that the letter goes to the Chief Executive of the Health Board.

So what we are trying to do is almost be a flak jacket for the clinicians and for the patients to ask in that way. That is the way we operate. It is very much been dictated by the size of the organisation and the limitations and resources that we have" – ***ASG2***

Because of the nature in the way they work to make an impact with the existing resources they have, the support groups had to position themselves at a higher level to get the maximum out from their cooperation with the Health Boards. Support across stakeholders in the Health Board was more focused on the clinical management of respiratory diseases.

"*Well, yes in so much that they [Health Board] support and they continue to support the development of the MCN [Managed Clinical Networks]and that they continue to provide the resources here for us to do our work where as in some areas they felt the network was not required. So I think that the Board recognises that the management of respiratory care pathways care certainly Asthma and COPD is a priority and certainly I would say that they do yes*" ***-RSPCON, HB***

The focus of the Health Board on the clinical management aspect of asthma among the Respiratory Consultants and Asthma Support groups becomes evident with support targeted at clinical initiatives. It was possible to gather from the reflections of the stakeholders in this subsection that there was a vacuum existing among support services and cooperation between the various stakeholders especially between the General Practices with the Asthma Support Groups and at the community health level, which would be important when the overall management of asthma is taken into context.

The next subsection explores the institutional/organisational factors that could shape the management of asthma at General Practices.

536 Institutional factors

Institutional/organisational factors influence the management of asthma at a variety of scales. The predictors of asthma management are likely to be influenced by both patient and service-led factors. However, health services are highly complex organisations comprising multiple organisational layers (Hoskins et al. 2012). The emerging institutional/organisational factors outlined in the commentary below from the General Practices, Asthma Support Groups and the Health Board give insights into the ways in which the management of asthma is influenced across this level.

The GP at Litchfield was queried on the number of patients that he saw at the Practice every day and his reflections showed that it was a very busy Practice.

*"Yes, Yes. It's pretty overwhelming"-**GP, Litchfield***

Consultations help to understand and treat the problems presented by patients on the day (reactive care), but can also address potential future problems (anticipatory care). The relationship between the patient and the doctor, who often know each other from previous consultations is a key aspect of a consultation; and the GP or Nurse would require the professional intuition to know how and when to extend the aims of a consultation. Thus, maintaining the relationship and ending on a positive note are important outcomes of each consultation (Watt 2011).The reflections of the GP at Litchfield indicated that this was not possible always. The Practice Nurse at Litchfield reflected further on a standard appointment for asthma at the Practice.

"*The standard appointment is twenty minutes for an asthma review which is quite a good time. If it is just slotted in, you get only ten minutes. If ten minutes is not enough we will try and bring them back in a couple of weeks you know to go over things more thorough but unfortunately sometimes you don't catch them back in a couple of weeks because by then they will feel a bit better and don't come"- **PN, Litchfield***

An important observation is that the Litchfield Practice is severely overwhelmed with patients and they may not be able to give the patients the standard appointment time of 20 minutes for an asthma consultation. As previously pointed out, even if there was a window of opportunity to accommodate that much time, was it possible to impart a self-management plan to the patient if the patient was not interested to improve his condition? This brings out the importance of time and building relationships. While the staff may be proactive to try and improve the management, it could be gathered that there was a sense of defeat prevailing among the GPs and Nurses because, from their perspective, most patients were unwilling to understand their treatment regimen or the inherent illiteracy factor could be playing a part. Or was it the way management initiatives were undertaken at the Practice? A practice can work in two different ways. It can either do things badly in a way that things just don't go right or it leads to innovation in trying to do things better. It was not evident from the staff in Litchfield practice were doing something to improve this situation. The perspectives of the official from the asthma support group ASG1 shed more light on this.

"I think there is a problem in primary care per se towards prioritisation of asthma. We do see a lot of people who end up in hospitals when they should not be going to hospitals. So I think there is work in primary care in a way we want to promote it .I think it is a UK wide issue than a Scotland specific issue"

*"I think our work if you can categorise as such would be more in secondary care .We don't have as much dialogue with Primary care as we would have liked'-**ASG1***

Part of the problem in Primary care as reflected by ASG1 was that patients were using the emergency route at hospitals for treatment when they had a problem with their asthma rather than consulting with their GP or Nurse. It could be due to the fact that patients would get immediate care when they were seen at the emergency rather than

wait for an appointment to see the GP or Nurse when their asthma flared up. The focus of ASG1 (which is a firm believer in self-management plans) has been primarily within secondary care as it is there where they can maybe have an impact as they are a small charity. To make an impact working closely with the Health Board, they may need to leverage where the admission rates and clinical management are at the highest level. This is evident in their admission that they have not initiated much prioritisation towards Primary care where the first point of diagnosis and management of the condition occurs in common mostly and secondary care is further removed from local contexts.

If asthma can be addressed from an environmental health perspective also, there are certain restraints present within the institutional agency as evidenced next by the Environmental Public Health Consultant at the Health Board:

"A lot of our time is having to respond to requests for advice for particular issues everything from managing a chemical suicide to the impacts of wind farms. We have to deal with a broad spectrum of things and so we can only allocate a proportion of our time to do proactive work and there is always competing for time in relation to that" – ***EPHCON, HB***

Environmental Public Health initiatives that can be prioritised for asthma are not able to match resources and time yet have to be answerable for problems like air pollution affecting health that make the headlines and may require immediate action. Even recent media reports point to the fact that air pollution is not effectively being tackled in Scotland or in the UK (Herald Scotland, 2016; The Guardian, 2016).

The Health Boards have been proactive in promoting management of asthma with the initiatives like the Respiratory MCNs and liaison with support groups like ASG1 and ASG2. But they have their own problems to deal with when trying to achieve a correct

balance to provide support for better healthcare across all care levels. The Public Health Manager at the Health Board gave more insights into this:

*"The GPs are being expected to do too much with too little. They are right at the cutting edge and they frequently make the point that they have done for a long time that at the end of the day everything seems to come down to them but nothing is actually done to help them. They are not usually given the resources to deal with the increase in expectation. So I guess the answer is from their perspective is yes. The Board of course will take a different perspective. In fairness to the Board, they do juggle with the scarce resources that they have. Everyone is tapping on the door needing more resources, so the constant issue is what is the best value for money?"-**PHM, HB***

The shift in allocating priority care to provide the best value with the limited resources available is not translated well as we see from a top down approach from the Health Board to the General Practice which is overwhelmed with patients especially in a Practice like Litchfield. Budget constraints at the Health Board level have a direct impact on local General Practices and at the same time as demand (and expectations) rise, the Health Boards would expect the 'best value for money' through unrealistic expectations for approaches to initiatives like self-management. It could be challenging to fund initiatives if the disease is not prioritised and if the Health Board is oblivious to the inherent contextual factors or just does not see it as part of their responsibility, it would deter successful outcomes for a disease like asthma.

Thus it could be seen that overburdened practices especially in a deprived area, and the lack of resource allocations and prioritisation putting pressure on both the General Practice and the Health Board who are stretched to their limits, were contributing to some of the institutional factors that emerged to be part of the local context in the management of asthma.

The next section explores the perceptions of the stakeholders of the local contextual characteristics ranging from the physical environment and social contexts which

patients with asthma are exposed to, and the ways these may influence asthma prevalence and management.

5.4 Perceived Local Contextual Characteristics

Place factors have an important role in the production of health and illness, and healthcare (Kearns 1993). Places have material effects on people e.g. the physical environment which comprises the natural environment (air, noise, water, greenspace etc.) and the built environment (houses, roads, transport systems and infrastructure including both the external and internal built environment). Places can be seen as the product of the socio-economic and cultural aspects of everyday life as much as their physical characteristics and shape individuals, societies and communities e.g. cultural norms, health beliefs etc. (Dorling et al. 2001; Gesler & Kearns 2005; Cresswell 2013).

Even though places signify a 'geographical locale', it also implies importance in meaning for the people who live there and also shaped by the people who have lived there in the past. Places are also shaped by local and national factors and so are continually changing and transforming (Cresswell 2013). It was necessary to understand how these place factors were perceived by the stakeholders to shape the management of asthma from local environmental contexts.

The health professionals spoken to know their patients live in challenging social contexts and it was important to understand if they took into account the role of the physical and social environment in their everyday management of asthma. This section begins by exploring the perceptions of the stakeholders on the local contextual characteristics from the general neighbourhood environment to the perceived physical

environmental triggers and social factors.

5.4.1 Neighbourhood

The neighbourhood environment plays an important part in influencing health (Mitchell et al. 2000). The literature review revealed that people living in different geographical areas apparently experience different degrees of and types of ill health (Ross et al. 2001), how poor health deteriorates by place of residence (Ellaway et al. 2012), how characteristics of neighbourhoods influence healthcare provision (Pearce et al. 2006) and how neighbourhood residence has an effect on child and adolescent outcomes (Leventhal et al. 2000). Hence it was important to understand the area characteristics and type of housing that the patients in these areas were exposed to. The GP and Practice Nurse at Vestville Practice gave an insight into the deprived neighbourhoods surrounding Litchfield.

*"Pretty much as deprived as it can get in Dundee"- **GP, Litchfield***

*"It is an area as you see of high deprivation, high unemployment, there is not a lot of private housing in the area so you know people are getting housed here and there is a huge drug population. Just general sort of deprivation"- **PN, Litchfield***

The health professionals understood that the areas in and around Litchfield General Practice had one of the highest deprivation rates in Dundee with high unemployment, drug abuse and the dearth of private housing meant a lot of people were staying in Council homes.

The researcher had taken a walk around the areas of Litchfield and Vestville areas to understand the characteristics of the place as a part of the case study. It was observed that most of the type of housing that are present in the Litchfield consisted of Council homes with some multi storied buildings and old tenements.

Even though there are some small areas of green spaces present in the surroundings they were not much open spaces and most buildings are situated close by with shops underneath tenement dwellings. They ranged from newsagents, pubs, betting shops and take away restaurants which may indicate that these places are more popular with the local people and may influence their daily lifestyle for example, access to cigarettes, alcohol etc. Some of the council homes were not of good quality but the multi stories in the background had been recently refurbished. Most of the patients in Litchfield resided in and around these areas.

In contrast these features were drastically different in Vestville. The type of housing which was present predominantly in Vestville were detached individual homes of good build quality. They were not closely congested as seen in Litchfield. There were also green spaces in front of the homes which were well maintained and big green parks around. Though there was a main road that had heavy traffic the priority for quiet residential arrangement of most houses in the area without any commercial establishments like pubs, grocers or takeaways gives an indication of the quieter living conditions present in Vestville. It should be noted that Vestville's patient population resides in areas with low, middle and high deprivation. The GP at Vestville reflected on this:

"It's kind of mixed. Certainly since we took on Meadow [closed General Practice] our deprivation payments have gone up considerably but even then the actual housing stock is not that bad. And even Meadow has improved from all the recognition that it used to be. Yeah there is not that kind of bad housing stock. That is not a big problem" - ***GP, Vestville***

The GP gave insights into the deprivation around the areas the practice caters to indicating that though they catered to mixed deprivation areas, their deprivation payments had gone up with the addition of the patients from the Meadow General

Practice which was closed. The NHS rewards general practices with "Deprived Area Enhancement" payments for taking in patients residing in areas of high deprivation. The general housing stock around the areas near the practice were of good standards and recent improvements in the Meadow area indicated that most of the practice population were not living in bad housing conditions and was not an issue of concern in these areas as understood by the GP.

Neighbourhood characteristics could be important contributors to inequalities in health as area of residence is strongly patterned with social position (Diez Roux et al. 2010). It was evident from the narratives of the health professionals from the two Practices that they were very aware of the character of the local areas around their Practices and the extent of deprivation that encompassed these areas. Deprivation per se was just one of the factors that added to the context of asthma in these areas but it was also necessary to explore the wider environmental and social issues related to asthma that were prevalent from the perceptions of the stakeholders. The following subsections gives insights into the perceived physical environmental and social characteristics prevailing in these areas.

5.4.2 Perceived Outdoor Environmental Triggers

The outdoor environmental triggers that influence asthma have been discussed in detail in the literature review (Chapter 2, Section 2.4.2.1). The key triggers found to influence asthma in patients were Ozone (Ponka et al. 1996; Rage et al. 2009), Pollen (Feo-Brito et al. 2007; Gonzalez-Barcala et al. 2013), Particulate Matter (Nastos et al. 2010;, Nitrogen Dioxide (Delamater et al. 2012; Breysse et al. 2010), Sulphur Dioxide (Ponka et al.1996) etc.

Dundee is a small city with a smaller population as compared to bigger cities in Scotland like Glasgow and Edinburgh. Though Dundee had a rich history of jute industries until the early 19th century the present day city boasts ~~of~~ a beautiful river front with clear air and water. But this is not exactly as it seems to be as there were areas in Dundee that featured in the most polluted places in Scotland (BBC 2013). The perspectives from the Environmental Manager at Dundee City Council shed more light on this.

"*What is difficult now from my own organisation and the staffs that are working with me is the factors of important concern are no longer visible now. When anyone looking out at the blue skies that we have today think that the air is healthy to breathe and clean. But now we have found out that the traffic related pollutants in urban areas have given rise to health concerns and that is what we are now dealing with.*

In Dundee, we have got an issue with NO2 and Fine Particulates. And in 2006 we declared an Air Quality Management area for NO2 and for PM 10 and these are areas in busy junctions. The small narrow streets within the city centre ,the high sided buildings that causes like a canyon effect is what we refer to as and it means that the main source of emissions is been identified as traffic within the city and is the same as any urban area like Glasgow, Aberdeen, Edinburgh. They have all declared NO2 and PM10 and the source of these pollutants have been identified as traffic related.-EM,

It could be gathered that vehicular traffic generated concentrations of pollution in Dundee and Litchfield featured one of the busiest main roads to pass through and out of Dundee. Even though the main pollutants like NO2 and Particulate Matter were major triggers for asthma as seen from the literature review, the perspectives of the environmental manager gave an insight that they were also playing part in Dundee too especially in areas traffic congestion but the transboundary effect of these triggers could affect a person with asthma living in nearer locales. The Environmental Public Health Specialist at NHS, Scotland gave a deeper insight into this context:

"I think people like to latch onto simplistic concepts that air pollution causes asthma

*therefore all you need to do is remove air pollution and you have solved asthma...Clearly that is not the way to approach it and it is a very complicated problem and yes if we improve the quality of outdoor air pollution that will reduce a little bit of the contributory iceberg if you like but it is not going to solve the problem at all in terms of all of it and it is a question of trying to move along in a variety of areas" -**EPHCON, HB***

The causes for severity in a person with asthma are complex and it is not just pollution alone. It needs to be noted that air pollution is a part of the complex context but sometimes it is beyond a person's control. Litchfield has a main road that featured as one of the heavily polluted roads in Scotland. It was interesting to see if the health professionals in Litchfield were aware of the environmental triggers in this context. Their reflections did not completely acknowledge this aspect.

"Average certainly it [air pollution] is..it is not particularly bad"- **GP, Litchfield**

"There is not a huge amount of pollution here in Litchfield"- **PN, Litchfield**

Patients should be aware of the triggers that could flare up their asthma but it would be doubtful if these messages could be imparted properly to them if the Practitioners were not updated in their knowledge about local external environmental triggers, did not find them important to talk about or may have been stressed enough because of the short contact time.

Within the Health Board level, there has been a recent initiative prioritised to look at asthma as stated by the Environmental Public Health Specialist.

"So in general terms, asthma is one of our key topic areas and it's because of its links with air pollution in generally and I think it is partly because there is a perception out there that you know traffic fumes cause asthma and there is still a lot of debate about that. We just had a series of parliamentary [Scottish] questions today asking these kind of questions so we really need to try and answer these questions better using what data we have pointing out where the gaps in the data are and trying to start to address those.

There is an initiative called "Know and Respond" that is basically a system set up looking

at the air quality index and saying in the local area what the air quality is going to be like and therefore people who have a respiratory condition like asthma or COPD can sign up to receive text messages or email giving them a warning that air quality is going to poor

*in their area just as it to be aware of that therefore they might want to make sure when they go out they take their inhalers with them .”– **EPHCON, HB***

These perspectives reflect that these initiatives may have been taken up due to the news headlines about air pollution in Scotland in particular. Evidence from research reveal disadvantaged people who live in poorer areas are often most vulnerable to the effects of air pollution (Wheeler et al. 2005; Neidell 2004). The ‘Know and Respond’ initiative launched by the Health Board would be helpful for a disease like asthma but it would be interesting to see how it would it work in deprived areas where resources for people are less. Also, these initiatives may work well in people who are empowered like those who are following a self-management plan and areas like Litchfield have patients with asthma who may be only interested to improve their own condition when a severe attack happened.

This section highlighted that even though air pollution is a major issue in Scotland and in parts of Litchfield in particular, the health practitioners were not completely aware of the real impact of these pollutants partly because of their own understanding on the importance of these triggers and patient apathy. It could be gathered from their perceptions that it was a factor seen outside the control of health practitioners on the ground. Yet, initiatives like the ‘Know and Respond’ from the Health Board target people who are supposedly empowered without taking into account disadvantaged populations who may have problems to access services or have literacy issues.

The next subsection explores closely the perceived indoor environmental triggers for

asthma which adds another insight into the overall context on the physical environmental triggers for asthma.

5.4.3 Perceived Indoor Environmental Triggers

The home environment involves the space where the individual will be spending a major part of their time. Indoor environmental triggers have been documented in the literature review to influence asthma (Han et al.2009; Richardson et al.2005; Lindfors et al.1995) (see section 2.4.2.1 in Chapter 2). The stakeholder's responses give an insight into what they perceive maybe influencing asthma in the case study areas.

"Come September or October that is when the moulds start growing again and that would always come out. They would say about their housing. That was a big issue, their housing" – ***RSPN, Litchfield***

"…smoky environments I suppose inside the house and so on. If the parents smoke, they [Children] will often get asthma as well. That kind of thing…So it's partly environmental, partly… partly…salutogenic"-***GP, Litchfield***

"Oh yes sometimes in a sensitive way we are not quite clear whether it's regarded as an opportunity to put pressure on the housing authorities to be rehoused which is understandable."-***RSPCON, HB***

The literature review highlighted that housing quality was related to disease progression (Krieger et al. 2002; Northridge et al. 2003; Evans & Stoddart 2003) and in the case of asthma it was evident it was having a contributory effect from the perspectives of the health professionals. They could refer to and recognise dampness and smoking as a common complaint in deprived areas mainly, and seen especially in council homes which are more present in the Litchfield Practice precincts though it was not much of an issue in Vestville.

A point raised by the Respiratory Consultant above, that perhaps patients just stated it to be rehoused, could also be a reason why the Respiratory Nurse in Litchfield

mentioned their patients talked about dampness. It provided an opportunity to assist the patient as the housing stock in Litchfield precincts was poor. Given the large proportion of time spent within the home, housing is both a key environmental influence upon health and a key health resource and it is especially important in relation to a disease like asthma.

It was interesting to know what the Environmental Manager and the Housing Manager at the Local Council had to say:

"*We probably get the dampness complaints more from the poorer quality housing and in areas where rented properties are. The housing section has done a lot to improve the housing stock of the Council owned but it does tend to be in the deprived areas where there are poorer quality housing and they can't afford to heat their properties to the level they should do and they are not ventilating their properties. It's that vicious catch 22 kind of situation that you are in" –* ***EM, LC***

"There is a mixture. When we go into certainly there is very few homes that are well maintained that would have a condensation problem because people will clean or ventilate. But when we go into houses that are heavily condensated, that's poor lifestyle"- **HM, LC**

The perspectives from the Environmental Manager and Housing Manager show that they are doing their best within their allocated resources to improve the condition of housing but they emphasise that the responsibility passes onto the people who may not be ventilating their homes as they ought to be, or due to the fact that they cannot ventilate because they were not able to heat up their home due to lack of money, poor insulation or general lifestyle. The researcher could observe during his walks along Litchfield that there was a lack of hygiene around some housing estates precincts with trash strewn around and dilapidated surroundings which may give an indication that people were not too concerned about their surroundings both internally and externally (it is important to acknowledge that this interpretation was based on

limited evidence). The physical characteristics of a neighbourhood are important in shaping health (Pearce et al. 2010) and it could be observed that there was a community/place level lack of cohesiveness and feelings of neglect.

The housing stock of the patients registered to the Vestville practice could be of better quality and as such the General Practitioner in Vestville will have presumed that indoor triggers may not be playing a part.

*"A few people will say my house is damp and I have fungus on the walls or whatever but again that must be a pretty small number of folks" -**GP, Vestville***

It could be opined from the reflections of the health professionals that identification of triggers, education and ways to reduce exposure to these triggers could be helpful for patients who live in deprived conditions but it could be tough for health professionals to convince them to change their lifestyle if they were not willing, in the view of GPs and PNs, to even take charge of their health as seen by the common factor of smoking that prevailed in both these locales, which is described next.

*"I think a lot of it is difficult to solve because if they smoke or if their families smokes and so on its hard to change their ways and I suppose again the way they are living are house is a bit damp maybe or housing conditions" - **GP, Litchfield***

Indoor tobacco smoke is one of the most common influencing trigger for asthma (Jie et al.2011; Heinrich,2011; Malveaux et al.1995). Smoking is a common social factor present in deprived areas (Ellaway et al. 2012; Burr et al. 1997) and is integral when considering both physical and social environmental triggers for asthma as it is present in both contexts. The reflections of the GP at Litchfield gave insights acknowledging smoking as an individual behaviour issue, which was probably not going to change and which was beyond the control and responsibility of the Practitioner. A study by

Stead et al. (2001) exploring area effects on smoking in disadvantaged communities in Glasgow noted that a poorly resourced and stressful environment, strong community norms, isolation from wider social norms, and limited opportunities for respite and recreation appear to combine an environment that fosters smoking but also discourage or undermine cessation which was counterproductive to a healthy lifestyle.

"The patients are aware that their damp housing affects asthma. They are aware that their smoking affects asthma. They are aware probably of those two factors. The indoor environment, the smoking and the psychological status. Yeah. All factoring probably. I couldn't say which one influences more but probably because a lot of them smoke very heavily a lot and that is a major factor. Even in step 3 [BTS asthma management guideline] it was difficult to get these patients asymptomatic because they took their inhaler and then they are inhaling a lot of cigarette smoke so it's like trying to put a fire out with a water pistol" ***–RSPN, Litchfield***

The Practice Nurse's reflection suggests that health professionals recognise that their patients are not ignorant about their smoking behaviour and their housing conditions which make their asthma worse. Though it can also be inferred that like the GP, the Respiratory Nurse believed it was a waste of time trying to change individual behaviours like smoking given the social contexts the patients with asthma were exposed to thus giving insights into the relationships/trust that exist between the GP/Practice nurse and the patients. The Practice Nurse at Vestville reflected further on trust between the practitioner and patient.

"What you find is people tell you what you want to hear so if an adult brings in or a mum brings in a child and you ask 'if there is a smoker at home?'. ' Yeah, I always smoke outside .I never ever smoke in front of the child'. So they are never ever going to admit that they smoke in front of the child… so it is very difficult to know whether that is a factor because they are telling you what you want to hear."- ***PN, Vestville***

This section looking at indoor environmental triggers outlined that from the perceptions of the health professionals at both the Practices, smoking in the form of

indoor tobacco smoke emerged as a common factor present in the patients with asthma in Litchfield and Vestville Practices. Even though the Practitioners were aware of smoking as an inherent factor, they had become resigned to a feeling of defeat as patients were not, in their experience, willing to change their smoking behaviour to improve their asthma and a sense of trust was not built between Practitioner and patient especially when it came to discussing smoking behaviour. It could also be seen as a social factor and is explored in depth in the next section which outlines the perceived social factors that can shape asthma that builds onto the wider environmental context that asthma presents in the two case study areas.

5.4.3 Perceived Social Factors

The social factors that influence asthma have been described in detail in the literature reviews (Chapter 2, Section 2.4.2.2). The main factors identified ranged from socio-economic status (Dawson et al. 1969; Shiue 2013), deprivation present in an area (Walters et al. 1995; Watson et al. 1996; Salmond et al. 1999; Roberts et al. 2012) and psychosocial stress (Wright et al. 1998).The stakeholders were queried on what they felt were the major social factors that shaped asthma prevalence and management.

First, the composition of the patients in these two practices was explored.

*"We don't have a huge amount of over 65's"-**PN, Litchfield.***

*"I would say middle aged and younger" - **RN, Vestville.***

According to the Practice and Respiratory Nurses, most of the patients registered in Litchfield and Vestville practices were young or middle aged. There were not many elderly aged people seeking treatment at the Litchfield Practice. The narrative of the

Respiratory Nurse at Litchfield who saw many of the patients on the asthma register gave insights into how patients presented themselves at the Practice.

*"Well everything from school children right through. There are not so many elderly people in Litchfield. They don't live that long. I feel sorry saying that. A lot of them would come in and you know I would ask their age and I was shocked at how elderly they looked and they would be younger than me. You know they looked like old people who were really with lots of arthritis. A lot of them came in interestingly with crutches, walking stick. …Why they have a walking stick? It's that kind of you know…and sometimes it was some sort of arthritis or something but you know a lot of them came in limping [smile], bad back. They had just all those kinds of issues"- **RSPN, Litchfield***

Since Litchfield was a deprived area, some of the points raised by the Respiratory Nurse on the characteristics of the patients she saw (low life expectancy, large number of patients who looked far too older for their age, having disabilities and being smokers) mildly suggested the fact there were many other pertinent issues in their lives. She was aware of the local population as being inherently unwell within the neighbourhood contexts which they live and their associated lifestyle behaviours which led to premature ageing and shortened lives. Thus, it would probably be always challenging to manage asthma in such a context because of the multitude of problems that patients may be experiencing. It was interesting to delve further exploring the Nurse Practitioner's attitude and interaction towards the patients which also revealed more of the patients characteristics.

*"When they come in you say "Oh God, no taste and dirty hair and stinker cigarette smoke Aww!! [gasps].What I felt was a lot of them, once you peel the layers of their onion off, they were lovely people in there" –**RSPN, Litchfield***

Often in medical practice, health professionals have to overcome what they perceive as first impressions, perhaps shaped by personal prejudice, when a patient consults them.They see the importance of building a relationship, seeing patients as more than a list of symptoms, or as a product of their area context. It helps practitioners

immensely as the patients shed their inhibitions, open up with their problems or anxieties and gain their trust.

Neighbourhood structural disadvantage contributes to the level of sociophysical disorder in the community, including violence which may, in turn, influence asthma (Wright et al. 2004; Wright et al.2006) thus making social contexts an integral and important factor to look into when understanding asthma and place effects. The perspectives of the Respiratory Nurse suggested the level of social stress the patients in Litchfield were experiencing. Living with lower socio-economic status (SES) is associated with experiencing greater chronic life stress, both at home and the external environment that the individual is exposed to which in turn may directly influence family conflicts, poor quality family relationships and most importantly the burden of disease on the individual. Sandel et al. (2006) concluded that when one loses the ability to cope or to take control over one's life or environment, one experiences stress. Next the impact of these stressors that were part of the social context was explored and the Community Health Nurse's perception were in sync with most of the problems found in deprived areas.

*"It's predominantly alcohol, drugs misuse…uhmm…smoking as well. There is major poverty and unemployment…that's the biggest thing in the area. There is massive unemployment and poverty. I think it's a mix of everything. I think a lot of it is stress. A lot of people smoke because of stress. I think for a lot of people its habit. I think a lot of people within this area. They don't have a lot of money, they are not working. There is lots of housing issues, Social issues, family issues. A lot of the time people do say that they are smoking to manage their stress" -**CHN, Litchfield***

*"The fact that most of the patients that I saw were unemployed because one of the first questions that I ask is: Are you working at the moment? You know that. .they are just …Just they are just pfff!!! [grimacing] down at themselves and so they feel …they are obviously feeling negative about themselves so that reflects on the way they manage their condition" – **RSPN, Litchfield***

"Alcoholism, drugs…we don't have a huge drug population but we still do have some"- ***PN, Vestville***

The different respondents interviewed were unanimous in naming smoking, alcohol and drug abuse as, from their perspectives, a significant problem in Litchfield but it was not a big problem in Vestville. This also would link with psychosocial problems with the poverty and deprivation of the area with stress being a very potent trigger to exacerbate asthma in a person or even drug abuse. It could be a reflection of poverty, family dysfunction, social dysfunction that becomes a part of the psychosocial problems that affects the individual and family. The poverty experienced by these patients may influence their lifestyle for example poor housing and upkeep (Evans et al. 2000). Even unemployment is more structural as they operate beyond the individual, usually determined by factors beyond the area or things that indirectly affect a person. The inclusion of unemployment in the deprivation indices (SIMD, Townsend) show how integral it is in the total construction of the index and the evidence from Litchfield rightly sums up how important it is. This shows that asthma does not operate in a vacuum and links to the many social problems experienced by the individual. The health professionals especially the Respiratory Nurse and Community Health Nurse are clearly aware of, from the evidence gathered in the research, the complex social problems that people in these areas face including lack of self-esteem and control over their lives.

Smoking was another important social factor that emerged out and reflected in this section.

"Smoking remains the biggest influence on asthma. I am astonished how many people with asthma still continue to smoke" – ***Director,ASG2***

*"Probably Smoking is one of the biggest problems, Alcohol problems, Social deprivation obviously and [small smirk] terrible lifestyles, awful diets. I suppose there is quite a lot of single mums. That kind of thing as well. One parent families and so on and their lifestyles are poor. I suppose there is a lot. Yeah I think there is a lot of other things but certainly smoking is one of the biggest problems and so a lot of them have asthma"- **GP, Litchfield***

Smoking is common in deprived areas (Kleinschmidt et al.1995; Austin et al.2005). It can be a social factor (Vries et al.1995; Colley et al.1973) and not simply an individual behaviour. Neighbourhood factors were related to asthma outcomes through behavioural rather than biological pathways (Barton et al.1982).This may be because neighbourhoods set up norms for what types of behaviours are acceptable and because people have a tendency to copy the behaviours of those around them (Chuang et al.2005). For example, neighbourhoods with higher rates of smoking would both expose youths to greater amounts of smoke and create social norms about the acceptability of smoking. Neighbourhood problems are associated with greater asthma symptoms via behavioural pathways related to smoking. Poor family relations may foster psychological experiences with direct physiologic consequences for e.g. the role of stress detailed earlier in this section (Suglia et al. 2011), whereas problematic neighbourhoods may operate by providing role models for maladaptive health behaviours (Chen et al.2007).

It is interesting in the sense that smoking can come under collective health behaviours or individual health behaviours where there is a culture of smoking which is accepted and normal. If there is a local culture of smoking and taking drugs, it can be quite difficult to convince the person that it is harmful to his health whereas in a different type of area it would have been unusual (Stead et al.2001). It could be perceived from the strong opinions that health professionals have about smoking, they see it as the

biggest problem, and relate it therefore to individual behaviour and poor individual lifestyle behaviours.

Low health expectations among patients with asthma were another factor that was increasingly opined by the respondents.

"They have lost the will to live really. They have just given up. Society has given up on them and they have given up on themselves and that's really sad" – ***RSPN, Litchfield***

*"They have low expectations and they get used to living with their asthma symptoms as well so they don't then think you know they think they are sick all the time and that just sort of their way sort of thing which is very sad" -**PN, Litchfield***

*"And I also feel that once diagnosed with asthma, if you have that badge and that label, it's easier to put it on than take it off "- **Director,ASG2***

Current literature also suggests that most patients who have low expectations of what can be achieved by asthma management and, therefore, may believe that periods of asthma exacerbations cannot be improved and are part of living with asthma (Haughney et al.2004). Do many patients with asthma who have been diagnosed with the disease make compromises in their lifestyle to adjust to life with asthma rather than striving to eliminate symptoms? Meyer et al. (2008) found out that patients may believe asthma exacerbations are part of the natural course of the disease and, hence, needlessly tolerate these episodes, using a 'wait and see' approach. It could be perceived that professionals tend to see people as fatalistic, unable to change and this may have an effect on their relationships with patients, consultations and in their management of asthma.

Thus, it also brings into context how patient populations are constructed by health professionals. Was it that if the individual with asthma who had low health expectations, smoked and came from a deprived area smoked, the Practitioner would

have assumed that the management initiatives in that individual was going to be futile anyway? It could be gathered from the perspectives of the health professionals that asthma is an accepted condition in patients and they harboured no desire to manage it properly unless there was a severity in their condition. These challenging social conditions impact both on the patient's health, their sense of control over their condition and; on the health professionals understanding of the causes of illness and in their practising of healthcare. Thus, it can be seen than these factors add up into the constellation of difficulties that build into the context that make the management of any condition like asthma complicated (Wright et al. 1998; Mortimer et al. 2002; Austin et al. 2005).

The next section incorporates an interpretation section that compares the findings from the two case study areas to understand the themes that emerge out from this case study.

5.5 Interpretation of the case study findings

This section interprets the findings of the case study which focussed on exploring the perceptions and opinions of the various stakeholders involved in asthma care and management to understand the role of the socio-environmental context in shaping the prevalence/causes of asthma, and asthma management at Scottish General Practices. The case study questions that guided this phase was:

- Does the management of asthma (including self-management) vary between areas of different deprivation levels and if so, how? (The analysis in Chapter 4 highlighted that deprivation was associated with the crude prevalence of asthma at Scottish General Practices and the case study explored this aspect in detail

uncovering the wider socio-environmental contexts that shaped the management of asthma at General Practices of different deprivation levels- Table 5.1 and Section 5.5.1 give an insight into this aspect).

- How do place factors that constitute the environment of an area shape the prevalence and management of asthma at the two General Practices from the local environmental contexts (perceived physical and social environmental factors)?(Section 5.5.2).
- Does support to management of asthma at General Practices differ between the stakeholders at the General Practice, Support Groups and Health Board level? (Section 5.5.3 and 5.5.4).

The case study compared and analysed two General Practices with dissimilar contexts in relation to crude prevalence and deprivation (High crude prevalence + High deprivation-Litchfield Practice *vs* Low crude prevalence + middle/lower deprivation-Vestville Practice) to understand the differences and similarities that existed in these contexts. The findings were interpreted from the perspectives gathered from the stakeholders involved directly or indirectly in asthma management from the two case study sites.

This helped to outline the themes that emerged from this case study which would be discussed at the conclusion of this chapter. Table 5.1 and Table 5.2 below illustrates the comparison between the Litchfield Practice and Vestville Practice based on the management of asthma and perceived local contextual characteristics gathered from the case study interviews and observations.

Health factors	Differences		Similarities
	Litchfield	**Vestville**	
Asthma	• High Prevalence • One of the top two diseases seen in the Practice	• Lower Prevalence • Ranks 4^{th} /5^{th} among diseases seen in the Practice	
Other Diseases	• Depression	• Chronic Heart Diseases(CHD)	• COPD • Diabetes • Cancers
Management of asthma	• High number of patients for asthma consultations	• Less number of patients seen for asthma consultations	
Awareness of medication			• Lack of awareness of medications

Medication Uptake	• General apathy towards improving their condition • Low health literacy and medication uptake	• Parents were proactive in improving their children's asthma management	• Lack of genuine interest to understand medications • Poor compliance • Poor inhaler technique among patients and maybe practitioners
Reviews	• Low attendance for both short term and long term reviews	• Parents brought their children regularly for reviews.	
Self-management	• Patient Illiteracy	• Lack of interest	• Preference for verbal self-management plans due to lack of time • No conformity in following a standard self-management plan among Practice Nurses • Viewed that self-management care plans were not working among their patient population

			the Practice may have assumptions that all is working well before the patient leaves the Practice.
Institutional Factors	• Very high number of patients seeking consultation daily • Time constraints • Lack of proactive support between GP staff and Community Health Nurses		• Health Boards and Asthma Support Groups appear to be disconnected from the problems faced by GP's and Nurse working especially in deprived areas. • Asthma support groups have strong relationships with the Heath Board but not at the General Practice Level

Table 5.2 Comparison of the management of asthma between Litchfield and Vestville Practices

General Features and Perceived local contextual characteristics	Differences		Similarities
	Litchfield	**Vestville**	
General Practice *(Extent, Composition of Patients)*	• Local patient population spread • Comorbidities present in practice population • Low life expectancy	• Wider patient population spread • Higher than average population for long term conditions	• Young and middle aged population
Neighbourhood	• High Deprivation • Council homes • Greater presence of establishments that may drive addictions	• Mixed Deprivation • Better Housing stock • Affluent areas	
Home	• Crowded homes		• Smoky Indoors

Perceived Environmental factors	Differences		Similarities
	Litchfield	**Vestville**	
Indoor	• Mould • Condensation • Poor ventilation • Poor heating	• Small number of people complain about dampness	• Indoor tobacco smoke
Outdoor			• NO_2 • Particulate Matter
Social factors	• High drug abuse • Unemployment • Single parent families	• Lower Drug Abuse	• Alcohol • Psychosocial Stress • Smoking

Table 5.3 Comparison of the general features and perceived local contextual characteristics between Litchfield and Vestville Practices

5.5.1 Main findings from the comparison of the case study sites

It could be inferred that the management of asthma varied between the two General Practices of Litchfield and Vestville though they did have some common factors too. The General Practice at Litchfield had a high number of patients seen for asthma almost every day but in contrast the Vestville Practice has to deal with patients from diverse backgrounds from near and far as seen in the geographical spread of patients at the Vestville Practice. The lesser contact time of GPs and Nurses with asthma patients could shape the way they understand asthma as seen in Litchfield where the Practice was overwhelmed with patients. The General Practitioner and Practice Nurses at Litchfield opined that the patients showed a general apathy to improve their condition and coupled with low health literacy, very low attendance rates for asthma reviews and the presence of comorbid conditions, it was a complex context they had to deal with their patients. In contrast, the parents of children with asthma in Vestville were very proactive in getting them to attend asthma reviews regularly and in medication uptake. Thus it could be seen that health practitioners understood the motivation (or lack of motivation) of patients as crucial to the success (or lack of success) of asthma management. But this was shaped by both place context, and time spent to forge relationships which are discussed in detail later in this chapter.

The common factors that hindered the management of asthma found in both these Practices, from the perspective of the stakeholders, were the persistent and problematic lack of awareness of medications among the patients, poor inhaler technique among the patients and maybe practitioners as perceived by the stakeholders. The GPs and Nurses were very critical of their patients as they focussed

mainly on compliance to medications which is a very medicalised understanding of asthma management. It was also seen that self-management was not working at all in both Practices. This may be due to factors within the Practice like time constraints, lack of support from the Health Board and asthma support groups, but also patient factors like uptake of self-management plans and literacy. It could be seen that the health practitioners were more focussed on clinical outcomes rather than trying to mitigate the inherent problems existing both at the practice and patient level due to their own understanding on the aspect of control and responsibility.

Support for the management of asthma at General Practices differed between the stakeholders at the General Practice, Support Groups and Health Board. At the General Practice level it could be inferred that support and cooperation was lacking between the GP, Practice Nurses and Community Health Nurses. Interestingly, the support structures are active between the Health Board and asthma support groups, but they were not aware of the reality that was happening at the General Practice level which brings into importance the aspect of relationships that existed. It could be opined that in relation to asthma initiatives, the Health Board and Asthma Support Groups did not recognise that the different contexts within which patients were living shaped their behaviour due to their focus on clinical outcomes.

The two General Practices have entirely different contexts in which their patient population lives. Unemployment, drug abuse, overcrowding and a young population were major factors seen among the patient population in Litchfield. The health practitioners are aware that the high deprivation rate has an influence on the living conditions, lifestyle and quality of housing but they were also not completely aware of

the real impact of air pollutants which was present in Litchfield partly because of their own understanding on the importance of these triggers and patient apathy. In contrast it was opined that the patients in Vestville came from relatively affluent and well off areas. Smoking, alcohol and psychosocial stress were other factors that were equally visible in both the areas as understood from the perceptions of the respondents.

Thus, it could be inferred that the management of asthma differed in these two case study areas and support to management of asthma at General Practices differed between the stakeholders at the General Practice, Support Groups and Health Board level. The socio-environmental contextual factors present in the area like deprivation, pollutants, health behaviours and low health expectations added to the challenging contexts on asthma was managed at Litchfield Practice.

One theme that emerged out from this case study was that asthma could be seen as a place based condition as there was a conflict between medical practice and the geographical/contextual understanding of place factors from the General Practice level to the Health Board. The stakeholders do understand the importance of place but they are constrained by the way that they practise. It could be argued that this links directly to the role of how control, responsibility and relationships in the management of the disease among the stake holders emerged as other important themes that would be discussed in the subsequent sections that will conclude this chapter.

5.5.2 Asthma as a place based condition

The case study demonstrated the need to look beyond deprivation (though it is very important as deprivation was found to be associated with the crude prevalence of asthma in Chapter 4) to understand the wider socio-environmental contexts that were

existing in the management of asthma. Kearns (1993) noted that place factors have an important role in the production of health and illness, and healthcare. It was seen from the evidence gathered from the perspectives of the stakeholders in the case study how they understood place effects could have an influence on patients with asthma e.g. factors from the physical environment (which included the external triggers like air pollutants, dampness, moulds, bad housing, tobacco smoke from the internal built environments), the social environment (deprivation, unemployment, health behaviours etc.). It was possible to infer the differences in the two case study areas and most importantly in the management of asthma especially at Litchfield Practice where asthma is prioritised due to its high prevalence among the patient population.

Litchfield had a localised patient population spread compared to Vestville. The GPs and Practice Nurses at the Practice were aware of the areas their patients resided in and the deprivation contexts they had to face despite the high number of patients they had to see every day. It should be noted that deprivation emerged as one factor that was associated with asthma outcomes in the majority of studies from the literature review like admissions to hospitals (Walters et al. 1995; Watson et al.1996; Salmond et al. 1999; Roberts et al. 2012), prevalence rates (Austin et al. 2004; Basagaña et al. 2004), symptoms and morbidity (Duran-Tauleria & Rona 1999; Jordan et al. 2014) and uptake of medications (Kwong et al. 2002). Despite the associations seen, the relationship between asthma and deprivation is more complex and it was important to interpret how health professionals understood their patient population with the contextual factors their patients faced with.

With the limited infrastructure and adherence to clinical guidelines, the health

practitioners at Litchfield found it very hard to act upon factors like dampness that their patients brought up during consultations. They know the importance of place factors; the behaviours exhibited by the patients seemed to reinforce their individualised understandings on how deprivation contexts could influence a person's disease. But they were constrained by the way they have to operate with the limited time available for consultations, resources, highly unmotivated patient population and lack of support from the Health Board or asthma support groups. They are also very aware of the constraints there are on patients to improve their asthma due to factors like low health expectations, low health literacy, poor health behaviours like smoking and general reluctance to improve their condition as they did not take their asthma seriously except when they had a severity.

The contexts health practitioners are faced with shapes their perceptions about how they see place but also their perceptions differ based on the role they have. The Public Health Manager at the Health Board had a completely different opinion on seeing asthma as a neglected disease which may be due to his own/health board understands of how asthma stands out as a disease in the population. Targeting asthma by 'folding in' with smoking showed that the absence of taking contextual place factors into account could lead to fatalistic views of ill health.

It may be possible to infer that people living in the same area are subjected to roughly the same kind of exposures but may have different outcomes due to their circumstances. Individuals might differ in their susceptibility to contextual influences on health, or the degree to which contextual influences impact on population health may vary depending on the health outcomes measured and with different populations,

from community to community and between areas (Ecob & Macintyre 2000; Lee & Cubbin 2002).

Macintyre et al. (1993) postulated that the environmental characteristics in poorer areas are detrimental to health and healthy living. The authors have described this as 'deprivation amplification' (Macintyre 2007), a pattern by which a range of resources and facilities which might promote health are less common in poorer areas (an extension of the 'inverse care law' first propounded in relation to health care (Tudor Hart 1971). The author stated that in areas with most sickness and death, general practitioners have more work, larger lists, less hospital support, and inherit more clinically ineffective traditions of consultation, than in the healthiest areas as seen in Litchfield.

These trends can be summed up as the inverse care law: that the availability of good medical care tends to vary inversely with the need of the population served (Tudor Hart 1971). Thus, it's interesting to note that asthma could be seen as a disease that is shaped by place and "area effects on health" (Macintyre et al. 2002); these 'area effects on health' that were perceived to influence asthma management could be observed in a highly deprived area like Litchfield. So place effects are evident in both the way they shape the behaviours and asthma symptoms of patients (in the view of GPs etc.) and in the way that asthma is managed. Also, it is interesting to note that compared to Vestville Practice, the relationship between the conditions that shape asthma prevalence and management is different in Litchfield due to their dissimilar deprivation and asthma contexts.

The distinct contribution of this case study to the thesis was that it gave insights on

how health professionals perceived their area, patient population and how they integrated this perceptions it into their practice as their understanding or lack of understanding or their inability to act upon their understanding of the socio-environmental context was one of key factors that shapes their management of asthma. Asthma could be seen as a disease that reflects the person, social and environmental character and quality of an area. The next theme focuses on the management of asthma where the theme of control and responsibility emerged to shape the way asthma was managed at the General Practices.

5.5.3 Control and responsibility

The case study area comparison of the management of asthma showed the common challenges that Health Practitioners said they faced at both the Practices, which ranged from lack of awareness of medications among the patients, and poor inhaler technique, to poor self-management uptake. These were factors seen in most patients with asthma in general (Finkelstein et al. 2002; Gibson 2004; Wiener-Ogilvie et al. 2007; Tse et al. 1991; Duerden et al. 2001). Litchfield Practice was also, as understood by GPs and PNs, compounded with low health literacy among its patients, very low attendance rates for asthma reviews and presence of comorbid conditions. The health practitioners there had a complex context to deal with their patients but in contrast, asthma was not much of a problem in Vestville Practice. It could be opined that the health practitioners in both the Practices understood the responsibility for asthma and asthma management lay with individual patients (and are the outcome of individual deficiencies, e.g. poor inhaler technique and low attendance). The evidence from the literature make the point that these are commonly held views in clinical medicine but

this research is presenting a different perspective where responsibility could be a shared norm if there was active participation from both the patient and practitioner.

The differing viewpoints of the GPs and the Health Board officials to mitigate these factors were quite narrow. They are aware that the causes are very complex and contextual but their responses are individualistic by implying that patients should comply with their medications, self-manage better or take responsibility. That is where the problem is. Is it the attribution that the patient should self-manage (so control is with the patient) or is the environment controlling e.g. they are poor or uneducated so they cannot possibly control or manage their own condition and so control is external to them? Or is control within the system? The Practitioners know they should be considering place factors but with the way that the health care system works (like adherence to clinical guidelines in the management of the disease, stress by Health Boards and Asthma support groups to impart self-management plans -even though they are not working) constrains the GP/Practice Nurse as it does not allow these place factors to be taken into consideration. So where is control in the health care encounter? It is not just about giving the patients more control; it is about the way to control management and who was responsible in the way it was controlled.

At the General Practice level, asthma management seems to rely primarily on the responsibility of the Practice Nurses than the GPs as they were entrusted with routine chronic disease management other than exacerbations. Due to the lesser contact time of GPs with asthma patients, it could shape the way they understand asthma even though they are locally based. So GPs may have a lesser understanding of the individual contexts patients are faced with but they retain a lot of power in the Practice in terms of

decisions and guidelines. If self-management is taken into context of responsibility, there were differences seen between the different stake holders as some of the health professionals might be removed from the localised contexts and their own understanding of how self-management of asthma is playing out.

By having no representation at the local level, the asthma support groups were unaware of the local contextual factors. This seemed to hinder and constrain their role as a responsible support structure as they have a very important role to play in supporting asthma at the General Practice level and assist in policy decisions of the Health Board especially in self-management. Recognition of individually focused health promotion campaigns like self-management have failed because people's behaviour is determined more than rational choice (Gibson, 2004; Wiener-Ogilvie et al. 2007; Tse et al. 1991) and institutional factors like underutilisation of these plans by health professionals (Hoskins et al. 2005; Wiener-Ogilvie et al. 2008) and failure to update the plans on a regular basis when given to the patient (Barton et al. 2005).The Health Boards would expect the 'best value for money' through unrealistic expectations for approaches to initiatives like self-management and even though they are aware of the contextual factors, they just don't see it as their responsibility.

This brings into perspective the role of relationships in the management of asthma which is discussed next.

5.5.4 Relationships

An integral theme that emerged from the case study was the importance of relationships that existed – within the practice (between GPs, Practice Nurses, Community Health Workers), outside the practice between the General Practices and

Asthma Support Groups/Health Boards and between GPs/Practice Nurses/Community Health Workers and with their communities/individual patients (it is important to note that this research considered one part of this relationship; further research is needed to understand patient perspectives on their relationships with health professionals). Asthma patients are the focus of attention from many stakeholders, at different levels, so the nature and quality of the relationships between them, and the information they pass between them (e.g. about cause of and responsibility for asthma management) is crucial. As a complex and persistent condition, the prevalence of asthma in some ways reflects the quality of these relationships as they are very critical in the management of asthma.

The divide observed at the Litchfield Practice (page 195, 2nd quote) between the clinical (individualised) and support (community level) types of engagement indicated that relationships within the Practice were not fruitful despite the fact they were sharing space in the same building. For a proper understanding of contextual level factors existing among the patients of the practice, the inputs of the Community Health Nurses would be very beneficial to the GPs and Practice Nurse because of their longer engagement with patients and work in the communities. The differences existing in the relationships between the GPs, Practice Nurses and Community Nurses may be due to the fact that GPs and Practice Nurses are more powerful than Community nurses in prescribing and treating patients. The contradictions/ tensions that are in place within the Practice would affect the relationships and trust between health practitioners (Cartwright 1991; Coulter 1999). This trust in relationship also varied when it came to patient consultation and the Practice Nurses.

The Practice Nurses were willing to build meaningful relationships with their patients but they were also skeptical about the degree of trust they could elicit from them as not all patients were the same. Even though they did recognise communication with the patients was important, it invariably was a constraint due to lack of time for each consultation which was an important factor to consider while trying building a relationship with the patient especially if self-management is taken into perspective.

It could be inferred that the focus of consultation first is on inhaler technique, rather than on 'helpful discussion and agreement' (i.e. building relationships – which take time). Even if there was a window of opportunity to accommodate that much time, was it possible to impart a self-management plan to the patient if the patient was not interested (from the perspective of the GP/PN) to improve his or her condition or if contextual factors constrained the patient from acting on the advice?

The relationships across the General practice to the Asthma Support Groups were minimal as the Support groups were not present locally as they chose to liaise with the Health Boards which made them oblivious to local contextual factors affecting the management of asthma at the General Practice.

Clark et al. (2009) noted that positive asthma outcomes are associated with specific programme characteristics: being community centred, clinically connected, and continuously collaborative. Programme developers and implementers who build these characteristics into their interventions will be more likely to realise desired asthma outcomes as cooperation across different levels between the stakeholders involved is also key for the successful management of the disease.

Thus it was possible for this case study to bring out the themes on the role of how

control, responsibility and relationships within the General Practices and between the stakeholders were important in the management of asthma at General Practices.

5.6 Conclusion

This chapter presented the results from the case study that concluded the final stage of this research. To understand the wider socio-environmental contexts shaping the management of asthma, a case study was undertaken corresponding to RQ 3 in this thesis, to understand what perceptions do stakeholders involved in asthma care have on the nature and extent of socio-environmental factors that shape the prevalence and management of asthma at General Practices in Scotland. In-depth semi-structured interviews were undertaken with stakeholders involved in asthma care and management to examine their convergent and divergent perceptions of the socio-environmental factors shaping asthma prevalence and management from the two case study areas.

It could be inferred that the management of asthma varied between the two General Practices of Litchfield and Vestville, have entirely different contexts in which their patient population lives though they did have some common factors too like lack of awareness of medications among the patients, poor inhaler technique among the patients and maybe practitioners as perceived by the stakeholders. The GPs and Nurses were very critical of their patients as they focussed mainly on compliance to medications which is a very medicalised understanding of asthma management. It was also seen that self-management was not working at all in both Practices and there was inherent institutional problems like lack of support and cooperation between practitioner and patient; and between the different stakeholders.

The limitations of this case study was that it did not involve patient's perspectives as the focus of this case study was to understand the way in which asthma was addressed and managed within these environmental contexts at the General Practice level by the stakeholders. Their perspectives are very significant as they are the main sources involved directly or indirectly in the care and management of the disease and exploring patient perspectives would be the next stage of this research in future. The absence of the patients' 'voice' helped in reflecting upon and interpreting the views of healthcare professionals (i.e. as opinions rather than as the 'truth' about patient motivations or actions).

The case study highlighted the importance of asthma as a place based condition and the distinct contribution of this case study to the thesis was that it gave insights on how health professionals perceived their area, patient population and how they integrated this perceptions it into their practice as their understanding or lack of understanding or their inability to act upon their understanding of the importance of the socio-environmental context was one of key factors that shapes their management of asthma.

The next chapter concludes this thesis where the main findings of the research are summarised.

Chapter Six

Discussion and Conclusion

6.1 Introduction

This chapter discusses the main findings from the research. Studies on asthma (causation/prevalence etc.) have generally focussed on considering the physical and natural environment characteristics while clinical management approaches are highly individually focused with a medicalised understanding of asthma. What is missing is a clear understanding of the socio-environmental context in the management of asthma. This is where the thesis makes a contribution.

The overall research aim of the thesis served as the basis for the literature review to explore factors that were studied in relation to asthma from the socio-environmental and disease management contexts, due to the multifactorial nature of the disease. Deprivation emerged as the 'dominant' socio-environmental factor from place contexts found to be associated with asthma outcomes from the literature review guiding for a critical interpretation and empirical analysis of the relationship between asthma prevalence and deprivation in the Scottish context (Chapter 4). The results from the analysis contributed to the understanding of what a conventional deprivation measure does/ does not reveal about asthma–place contexts and also helped to advance the research into the next stage to explore the way that health professionals (and related stakeholders) understand and respond to these factors that shape the causation and prevalence of asthma (including socio-environmental contexts); and

how this in turn shapes their management of the condition in their practice using in-depth case studies (Chapter 5) undertaken at two General Practices located in areas of dissimilar deprivation levels.

The empirical chapters provided evidence that was related to the specific research questions and objectives for each phase. This chapter bridges together the key findings from these phases which helped to interpret, understand and explain the relationships, mechanisms and complexities that existed in the environment of an area that had the potential to shape the way asthma was managed at the General Practices located in the case study areas. The findings were then synthesised to a logic model that helped to demonstrate and explain the contexts in which these factors had the potential to play a part in the prevalence and management of asthma at the two General Practices that were looked into. The chapter also highlights the strengths and weaknesses that arose from the different methodologies adopted, contributions and limitations of the research, implications for practice, policy and scope for further research. The next section summarises the findings from both the data collection phases and draws out the key themes to be discussed in this chapter.

6.2 Summary of key findings

The research questions and findings are presented in table 6.1.

Analysis Variable	Overall Research Aim	Key Findings	
	The main aim of this research is to identify, understand and interpret the nature and role of the socio-environmental context in relation to asthma prevalence and management at the Scottish primary care setting.	**Chapter 4** (Secondary Data Set)	**Chapter 5** (Case studies)
Crude Prevalence of Asthma	**Research Question** What is the relationship between deprivation and prevalence measured at the at the patient and practice level at General Practices in Scotland? How do place factors that constitute the environment of an area shape the prevalence and management of asthma at the two General Practices from the local environmental contexts (perceived physical and social environmental factors)	The empirical analysis showed there was an association between the crude prevalence of asthma and deprivation	<u>From the perceptions of the stakeholders:</u> Factors pertinent to high deprivation areas are clearly associated with high crude prevalence of asthma e.g. Smoking, Low Health Literacy, Poor Medication uptake, Living conditions (Lifestyle, quality of housing)

Analysis Variable	Research Questions	Key Findings	
		Chapter 4 (Secondary Data Set)	**Chapter 5** (Case studies)
Management of Asthma	Does the management of asthma (including self-management) vary between areas of different deprivation levels?	*	<u>From the perceptions of the stakeholders:</u> Practice constraints, patient illiteracy, low health expectations, low attendance for reviews were common factors that was present in Litchfield Practice (High Deprivation, High Crude Prevalence) whereas these were not a problem in Vestville Practice (Low Deprivation, Lower Crude Prevalence). Self-management uptake was poor in both case study areas due to patient apathy, practitioner constraints and lack of easier action plans to impart as the present ones were too lengthy. Lack of cooperation and consensus in the approaches to asthma management between the primary care level, support groups and health boards was seen.
	Does support to management of asthma at General Practices differ between the various stakeholders involved?		Lack of cooperation and consensus in the approaches to asthma management between the primary care level, support groups and health boards

Table 6.1 Research Questions and Key Findings

	Do the stakeholders understand the multiple and complex determinants of asthma in the areas?		The stakeholders are aware of the contextual factors but are constrained in the way they practice and approach the management of asthma.

Drawing from the findings that emerged from the two phases, the key themes that emerged out from the results for discussion in this chapter were:

- Understanding the salient role played by the socio-environmental context in the crude prevalence and management of asthma.
- The inherent pitfalls existing in the management of asthma including self-management at the patient, practitioner and organisational level.
- The nature of the data that was available.

These themes are discussed in detail in the next sub sections.

6.2.1 Understanding the salient role of the socio-environmental context in the crude prevalence and management of asthma in Scotland

"Health in populations emerges from a complex interplay between the physical environment, social environment, individual response and behaviour, genetic endowment and the provision of services interacting with economic and other influences from which the health of a city emerges"(Hanlon et al. 2006).

Though there are various factors that affect health especially in a multifactorial disease like asthma, the aim of this research was to identify, understand and interpret the nature and role of the socio-environmental context in relation to asthma prevalence and management at the Scottish primary care setting. The research first looked at how socio-economic deprivation could account for asthma prevalence. The results from the analysis showed that there was an association and deprivation may have been operating in a complicated manner.

The results from the case study revealed that deprivation was one of the key socio-environmental place factors surrounding the environment of the case study areas and played a more important role in the prevalence and management of asthma at the two General Practices.

The social factors at the individual level ranged from socioeconomic status, unemployment, alcoholism, smoking, drug abuse, psychosocial stress, low health literacy and expectations; and at the community level from deprived neighbourhoods, poor housing quality and lack of support structures present. The Litchfield practice was situated in a high deprivation area, with a high crude prevalence rate for asthma and most of the patient population came from a local spread of the practice coverage areas. From the perspectives of the GPs and Nurses it was apparent that most patients with asthma came from deprived backgrounds with poor health literacy and expectations, were smokers, had comorbid conditions in addition to asthma and were not ready to improve their condition. These factors formed part of the compositional attributes i.e. the characteristics of the individuals living in the area, contextual attributes i.e. exposure to the features and characteristics of the area in which the individual lives and collective characteristics i.e. the importance of shared norms, traditions, values, and interests that exist (Cummins et al. 2007) in the case study area, thereby underlying the importance of how the social environment was a vital factor to be considered when looking at place effects on asthma prevalence and management.

As seen from the findings from the literature review, poor patients are more likely to have poorly controlled asthma possibly because of less recognition or concern regarding their symptoms (Connolly et al. 1989). Poverty has other effects on asthma.

It contributes to exacerbations, is a determinant of the quality of care that patients receive, and determines the psychosocial behaviour which in turn impacts the management and prognosis of the condition (Sánchez-Borges et al. 2011) for e.g. at the home scale, the social environment is directly related to the physical environment like smoking behaviour and indoor pollution or poverty with poor housing (mouldy interiors, dampness) leading to asthma exacerbations in the individual.

It was possible to interpret the different levels in which these social factors operated where factors like smoking, unemployment and low health literacy and expectations was visible and operating at a local level (home, neighbourhood, General Practice) and yet was not adequately addressed at the organisational level (Health Boards, Asthma Support Groups) when implementing management strategies for treatment (self-management especially) and decreasing asthma morbidity in the population especially in areas of high deprivation. The findings expand on with the observations of Clark & Nothwehr (2014) that asthma management by patients is influenced by their social environment and this aspect of control is least well understood. There was a gap that failed to address the social factors when focus was more on clinical treatment and adhering to clinical guidelines despite knowing the multi factorial nature of asthma.

Neighbourhood contexts, defined by their characteristics related to socioeconomic disadvantage, physical conditions, and social processes, may play a critical role in accounting for the social disparities in asthma (Wright & Subramanian 2007). It was also possible to interpret the life course of individuals and how they were stuck in an environment that they could not leave very frequently e.g. single unemployed families staying in overcrowded housing with poor health literacy and low health expectations.

The human social environments and the importance of place and local context become apparent. For example, it was also possible to interpret how neighbourhood factors have effects on asthma by changing behaviours adopted from neighbourhood characteristics, like the culture of smoking prevalent in high deprivation areas where individuals with asthma are more likely to, both, be exposed to second hand smoke as well as to be smokers themselves (Barton et al. 1982; Sherman et al. 2010).

If people were not in control of their lives, therefore how could they be able to control their health? Also, the case study helped to contrast the two areas, when there was such a spread of population for the General practice like Vestville, it could be more challenging as a researcher and others to understand the contexts in which asthma is produced as its varied (social contexts, economic, environmental contexts). If it was a more tightly bound area where the patients from Litchfield were concentrated, it could be said for example all of these people are experiencing roughly the same urban environment although it may vary at the micro level.

Thus it becomes apparent to understand and acknowledge the importance of the social environment with its 'collective characteristics' that encompasses the 'contextual' and 'compositional' attributes, a patient with asthma comes from especially in Scotland where high deprivation is a common feature in urban areas (The Scottish Government 2012). This in turn will help to implement improved measures for the management of asthma, understand which environments are most salutogenic for better asthma outcomes and taking into account personal characteristics of individuals and social backgrounds they come from, can be vital in effective management of the disease and reduction of crude asthma prevalence rates which is discussed in the next section.

6.2.2 The inherent pitfalls existing in the management of asthma including self-management at the patient, practitioner and organisational level.

There is broad agreement that overall standards of care for people with asthma remain inconsistent resulting in the level of control falling short of expected targets (Rabe et al. 2004). The relative contribution of different levels (from patient, through practice and local services to regional structures) responsible for these variations in quality care is currently unclear, yet likely to be relevant (Hoskins et al., 2012a) but this research revealed insights into some of the reasons for these variations.

Collating the case study interview data from the stakeholders involved in the management of asthma revealed some of the problems and gaps that were present at the patient, practitioner and organisational level in the management of asthma at the case study areas.

The interviews with the GPs, Practice Nurses and Respiratory health nurses gave their *'insights'* into the common factors that hindered the proper management of asthma at the patient level from their perspectives. At both the General Practices, the health practitioners were of the opinion that patients with asthma were not aware of their medications, were poor compliers to medications, had improper inhaler techniques, very poor uptake of self-management plans and most of the patients with asthma were smokers. These factors were not surprising as they were some of the common factors highlighted in the literature review (Laforest et al. 2007; Bosley et al. 1995; and Hoskins et al. 2012a).

Despite a designated asthma clinic in place every week, the patients in Litchville practice were perceived to be poor attenders for reviews and sought treatment only when their condition got worse. Combined with perceived poor health literacy, patients being seen for asthma consultations and exacerbations daily was a common feature in Litchfield Practice which was located in an area of high deprivation. It was different in Vestville which had lesser number of patients seen for asthma every day.

At the practitioner level, the more apparent features that emerged out were practitioner disillusionment with patients who were perceived as not being willing to improve their condition, lack of time for asthma consultations especially in a highly overwhelmed practice like Litchfield and lack of cooperation and support existing between the Practitioners and Community Health Nurses.

At the organisational level, it emerged that there was lack of support existing between the asthma support groups and the primary care level. Despite clinical initiatives at the Health Board level to improve management of asthma, the Health Boards adhered to a "One pill fits all" approach especially in self-management revealing a disconnect with the reality happening at the primary care level (where the GPs and Practice Nurses were finding it difficult to impart self-management plans for lack of time, difficulty in filling out given the time available to the Practitioner and teaching the patients on how to use these plans). This confirms with the findings by Moffat et al. (2007) that explored the views of health care professionals towards asthma guidelines and self-management plans to identify why these are not used routinely in General Practice. Thus, it could be opined that the management of asthma was more likely to be influenced by patient, practitioner and service led factors too.

It was also evident that the assumptions or determinations of the various stakeholders (GPs and Nurses, Asthma Support groups, Health Board Officials) differed yet it was also difficult to impart proper management if the patients were not proactive to improve their condition. There is evidence that self-management strategies, although widely promoted, continue to be poorly implemented (Picker Institute 2006). It may be interesting to note that 'adherence' to these plans could be the flip-side of 'responsibility', i.e. the more you give individuals the responsibility to control their asthma the greater the likelihood that their degree of adherence will vary, depending on individual and social contexts.

The GPs, Nurses and Community Health nurses were trying their best to improve the management of asthma in patients in Litchville but the patients apparent disenchantment (low health literacy, low health expectations) combined with asthma exacerbating behaviours (smoking, poor uptake of self-management plans) were also driving forces that may contribute to poor asthma outcomes in a high deprivation area. These factors were common in many high deprivation areas (Wainwright et al. 2007; Connolly et al. 1989; N. Clark et al. 1999).

The association between socio-economic status and health disparities may be determined through increased exposure to acute and chronic stress, compounded by the presence of overburdened or absent social supports, psychological morbidity (e.g. anxiety or depression), and lack of control over one's life (Adler et al. 2003). The patients with asthma especially in high deprivation areas have, interpreting the voiced perceptions of the health professionals, limited understanding of their condition and have complex issues in their lives; these were some of the factors that could have made

them consider that their asthma was less important than where their next meal would come which made the management of the disease extremely difficult.

Though the asthma support groups were active at the higher Health Board levels, both the stakeholders (ASG1, ASG2 and the Public Health Manager) were less aware of the reality that was happening at the Primary care level. This disconnect was apparent in clinical management initiatives for e.g. self-management plans which needed to be easier and tailored to recognise the different contexts within which people with asthma are living had the potential in shaping their health status/behaviours. This maybe because the different stakeholders build their perspectives based on their levels of interaction with the patients. The Practice Nurses were stretched for time and wanted simpler plans but ASG1 championed the need to promote their own self-management plans without addressing problems at the practitioner or patient level that made their plans difficult to impart.

Some of the problems existing in the management of asthma at the case study General Practices were similar to the findings of Ganse et al. (2003) who looked at the factors affecting adherence to asthma treatment from the patient and physician perspectives and highlighted: patient-physician relationship, patient understanding of the disease and its treatment, patient beliefs/attitudes and perception of disease/treatment and patient willingness to take an active part in asthma management were needed for the successful management of the disease.

The research did not look to assess asthma outcomes but sought to interpret how the socio-environmental contexts surrounding the area an individual lives could shape the crude prevalence and management of asthma at General Practices. It looked at how

deprivation was associated with crude asthma prevalence and management but also was able to bring out the ways in which the management of asthma among stakeholders was shaped by the socio-environmental contextual factors present in an area.

However, it was also possible to understand from the perspectives of the GPs and Nurses that some patients with asthma who came from an area of lower deprivation handled their health better than patients from a high deprivation area who came with complex needs and complex backgrounds. It could be because they had a very medicalised/clinical assumption and due to their own strategies to approach and compliance to guidelines in treatment, their hands appeared to be tied when confronted with such complexities.

The case study revealed hidden factors that appeared to be submerged under the management of asthma which ranged from the patient, practitioner and health board level and which if not adequately addressed may have an impact on the overall management of the disease at Scottish General Practices located especially in areas of high deprivation.

6.2.3 The nature of the data that was available

The overall research questions drove the data acquisition for this research. The sequential phase approach aided the analysis of data at each phase and two types of data were used in this research.

1. Quantitative Data (Asthma audit, SIMD)
2. Qualitative data (Case study data: Semi structured interviews)

6.2.3.1 Quantitative data

The secondary data was utilised at the data analysis phase (Asthma audit dataset, SIMD) and case study phase (interview data, observations of the case study neighbourhoods). Utlising the UK wide asthma audit dataset was very helpful as it contained data from Scottish General Practices which was the geographical and population focus of this research. The General Practice sample size of 10.1% was adequate to be a representative sample of the total General Practices in Scotland.

The main deprivation indices used in the analysis was the SIMD which is calculated at the datazone level was used as deprivation measure in the Scottish Health Survey which was published in 2011. It showed that there was a significant association between area deprivation (SIMD) and the prevalence of wheezing (symptom of asthma) and doctor diagnosed asthma in children from survey data. Wheeze which is a symptom of asthma was used as one of the symptoms to measure asthma in the questionnaire. Children in the middle deprivation quintile were the least likely to have experienced these respiratory symptoms while those in the most deprived quintile were the most likely (The Scottish Government 2011).

Also, the limitations in this data analysis were that it was difficult to obtain data on health behaviours that may influence asthma and deprivation like smoking or psychosocial stress. The quantitative analysis results helped to add and interpret further through the case studies on the socio-environmental contextual factors that shape asthma prevalence and management at Scottish General Practices.

6.2.3.2 Qualitative Data

The advantage of using semi structured questions for the interviews with the stakeholders was that the respondents gave detailed information in their own words and provided insights into their perceptions and ways of thinking that aided in the interview analysis. To ensure honesty in respondents when contributing to the interviews, the participants were given the right to withdraw from the interviews at any time and were not required to disclose an explanation. The participants were encouraged to be frank right from the outset of the interviews to establish a rapport with the researcher. During the course of the interviews, the researcher held periodic debriefing session with his supervisors for discussion and it helped in understanding and rectifying approaches to get better insights to enhance the interview data collection. The researcher has tried to minimise response bias by highlighting the most common perceptions put forth from the various stakeholders and where differences were seen was highlighted to show the difference of opinion through the quotes and was interpreted accordingly. The absence of the patient's 'voice' helped in reflecting upon and interpreting the views of healthcare professionals (i.e. as opinions rather than as the 'truth' about patient motivations or actions).

6.3 Reflexivity

Over the course of time that proceeded from the literature review, data analysis stage, case study data collection to analysis and finally interpretation, the initial thoughts on asthma that were present in me as a medical doctor had changed considerably. This

research has underscored and highlighted the need to understand the complexity with which asthma presents itself within individuals and systems.

Another challenge that came across was that the two case study General Practices had a population spread that covered locally (Litchfield) and wider areas (Vestville). It was challenging to understand the contexts in which asthma is produced within varied social, environmental, economic contexts as the population spread was not homogenous. The evidence gathered from the case study interviews helped in understanding that most of the patients would be experiencing roughly the same urban environment yet it could vary at the micro level (home).

The Case study helped to capture the different perspectives on the way asthma is managed at the General Practice. The interviews with the different stakeholders made me realise how difficult it would be to understand a problem context as they were talking from their own personal perspective based on their interactions with the patients or views on an issue. Triangulating and reflecting upon these viewpoints helped me in explaining the different types of interaction. For example, the Practice Nurses or Respiratory Nurses in the General Practice were the ones who interacted most with the patients yet the GPs spent limited time with the patients as they were called only when there was an exacerbation to be treated. The response from the GPs were based on their limited interactions yet the richness of the evidence data on patients came from the 'perspectives' of the Practice Nurses, Respiratory Nurse and Community Health Nurse. Another instance was to understand how support for asthma was going to be transparent at the Primary care level when asthma support groups were active and vocal only at the Higher Health Board level. They had less

interaction at the Primary care level where most of the problems were underlying and without understanding the needs of the Nurse practitioners or patient population that were most vulnerable, it was possible to reveal where the gaps lie that needed attention. These observations helped to add another interpretative, reflective layer to the problem contexts.

The Case study did not involve interviewing patient's perspectives because the focus of this case study was to understand the way in which asthma was addressed and constructed within these environments by the stakeholders involved in asthma care and management. The results from the quantitative data analysis drove the way forward to undertake this distinct approach in the case study exploration which is a new way to understand asthma. The next section discusses the contributions and limitations of this research study.

6.4 Contributions and Limitations

The research looked at the nature and role of the socio-environmental context in relation to the prevalence and management of asthma at Scottish General Practices. The key focus of the research was the way that health professionals (and related stakeholders) understand the factors that shape the causation and prevalence of asthma (including social and environmental contexts), and how this in turn shapes their management of the condition in their practice. The strength of this thesis lies in the research methodology adopted and the importance of integrating an interdisciplinary approach at the intersection of social (e.g. Geography) and applied health sciences (e.g. Public health) which helped to adopt multiple methods to gather and analyse the data for this thesis.

The research methods were driven by a critical realist (ontological) and pragmatist (epistemological) approach. Critical realism recognises that that a mind dependent aspect of the world we see, reaches to understand (and also comes to the understanding) of the mind independent world. It was possible to understand that though there was a high crude prevalence of asthma in Scotland, it was only a small part of the larger picture and there were many facets that still remained hidden. Critical realism helped to recognise and acknowledge that it was not possible to know everything, but only see what was in front and what was seen, through a particular lens. There were unobservable events happening in the background which caused the observable ones and the reality was only understood when the structures that generate these unobservable events are understood. This helps in distinguishing the event (asthma outcomes) and the structures (socio-environmental contexts) what causes it.

Pragmatism gave the freedom to adopt a sequential approach that involved the best suited method to address the research questions at each phase acknowledging the limitations of each method but also recognising how the different methods adopted (Quantitative analysis and Case study) could complement each other bringing out new knowledge that critiqued existing assumptions.

The strength of this research also lay in utlising the findings from the two phases to understand the main driving factors existing in the environment of an area that could shape the prevalence and management of asthma at General Practices with dissimilar deprivation rates. This is explained by a Public Health Model adapted from a modified version of the Diderichsen and Hallqvist's social production of disease model (1998) which explains the mechanisms in which the environment of an area leads to

differential exposures, consequences and susceptibility in people suffering from asthma and helps to understand how health disparities are produced and reproduced over time.

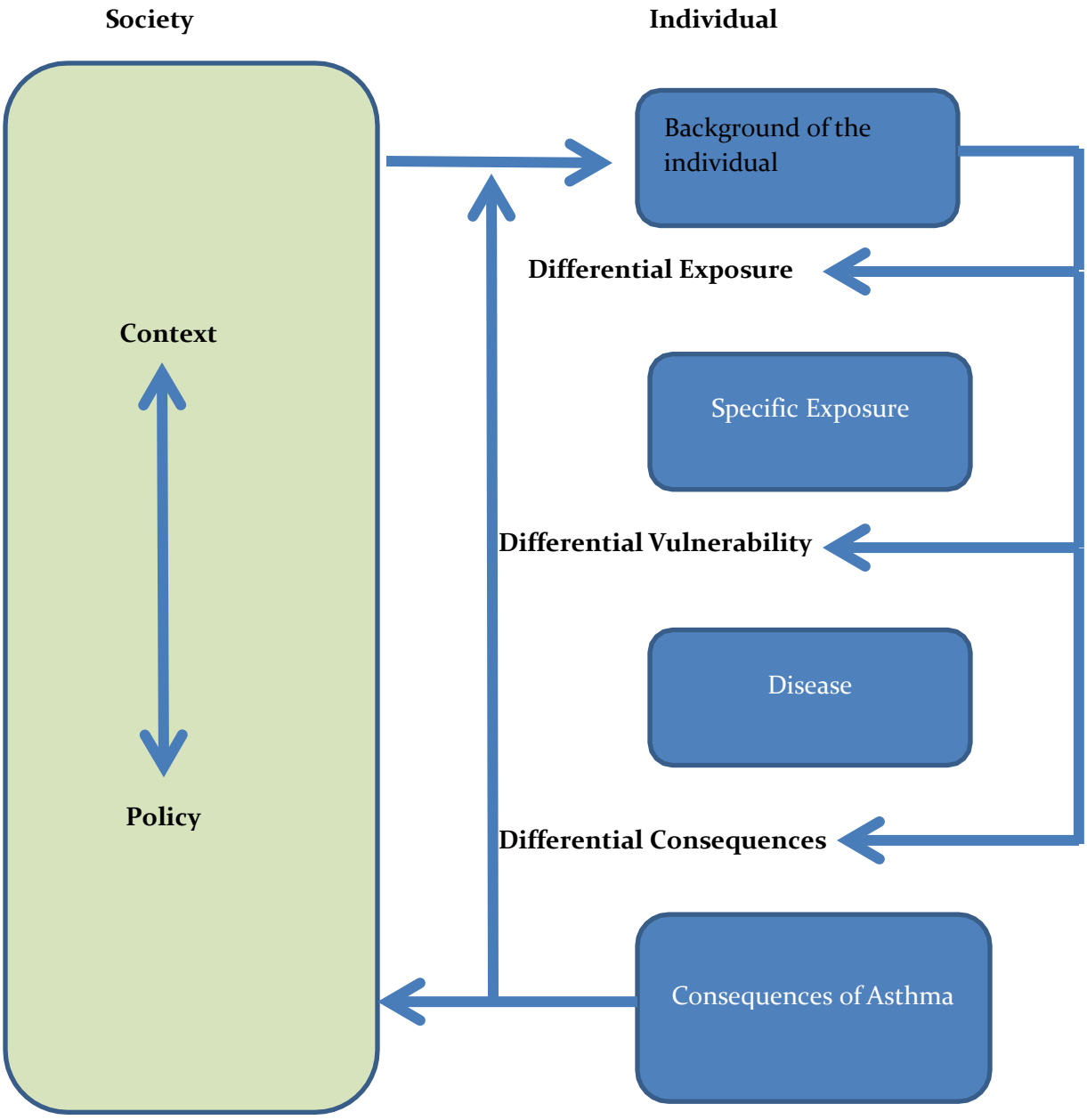


Fig 6.1. Modified Diderichsen and Hallqvist Model to explain the mechanisms of environmental influences on an individual with asthma

At the individual level, the model depicts the pathway from the background of the individual with asthma (poor/affluent, educated/ illiterate), who may have differential

exposures to specific disease exacerbating or benefitting causal factors (smoking/stress/organisational stress/ regular review/low health literacy/ poor medication intake/compliance to self-management etc.) and this may reflect on the differential vulnerability on the individual which maybe for better or for worse producing differential health outcomes (poor or well controlled asthma). If the individual already has fewer resources and opportunities, the consequences of the disease are more severe for the person which needs to be acknowledged at the policy level for better outcomes.

The model connects to the different environments an individual with asthma is exposed to. The differential vulnerability and consequences would span across the management of asthma aspect to produce the consequences of asthma whether it would be well controlled or poorly controlled in the individual. It's possible to understand that the most vulnerable people in the most deprived areas would have poorly controlled asthma due to a number of factors they are exposed to though it differs in each individual and the extent of exposure.

The Model was utilised late in the research as it was advantageous to explain the mechanisms after the evidence base was collated. Since this research study is closely related to both Geography and Public Health, the model was easier to adopt. There are other models in Public health like the Dahlgren and Whitehead (Whitehead et al, 1998), Ottawa charter for health promotion, but this research did not test them as it would have meant to step out of the interdisciplinary approach that this research utilised.

The logic model helps to explain how the larger environment can be linked to asthma outcomes and there are multiple pathways on how the socio-environmental context has the potential to shape asthma management at the General Practices. These factors would have implications in policy and addressing these factors at each differential level would help in mitigating some of the problem context.

The limitations of the research study were not limited to a specific phase. The QOF crude prevalence data available for analysis from ISD Scotland was the best available data source and a proxy indicator for the prevalence of asthma as it gave a percentage of the practice population suffering from asthma. Specific prevalence rates for diseases like asthma are not available on public domains and held with the General Practice Research Database (GPRD) for which access was tough as it was not available for individual research.

It was possible to incorporate deprivation indices (SIMD) into the research study as it was easily available and was used in previous health research especially in asthma as shown earlier. Comparison with the ISD crude prevalence rates of asthma may not be a good indicator to show any correlations between socio-economic deprivation and crude prevalence of asthma.

It needs to be acknowledged that some affluent areas may come under deprivation categories due to their close proximity to deprived areas or vice versa and may have implications for the reliability of the data in understanding deprivation exposures. Also, the Vestville Practice had a policy that accepted patients from a wider catchment area. This was not wholly representative of their immediate surrounding socio-economic conditions but the Litchfield Practice had a more local population which

mirrored the deprivation status of the area in their patient population from the stakeholders' perspectives.

The case studies did not involve patients because the focus of the research was to explore the way the socio-environmental context is understood and addressed in the management of asthma by the different stakeholders involved in asthma care. In addition, access to patients would have been time consuming as it would require acquiring ethical approval from the NHS, patient selection and selecting appropriate data collection methods. The research also did not gather observational data to understand how practitioner's and patients interacted with each other to discuss the management of asthma as not many practitioners would approve of this approach, it may also involve certain degree of bias and would also require ethical approval from the NHS. It is important to acknowledge the limitations and the extent to which the research study could progress within the time frame available.

The interview data built onto the evidence gathered and it is important to understand that the stakeholders' '*perceptions'* of asthma management helped in understanding and uncovering some of the inherent problems existing. The research has tried to incorporate and build on to the evidence base collected through the quantitative analysis and the interview data has helped to capture the different complexities existing in the management of asthma and the need to take the context of the environment surrounding the patient into account for the proper management of the disease which is described in the next section on policy implications.

6.5 Recommendations for policy and practice

The results from the research narrowed down to reveal the problem contexts and some of the mechanisms in play as demonstrated in the logic model previously that might account for the high crude prevalence of asthma in General Practices in Scotland especially in areas of urban high deprivation.

The nature of this PhD research was that it explored asthma as a disease with health, social and environmental dimensions. Most General Practices and hospitals in the UK follow the BTS-SIGN Guideline (British Thoracic Society 2014) for the management of asthma which stipulate clinical management steps using medications (assessing control, checking inhaler technique, concordance with treatment and providing self-management advice). The latest policy document published stipulates practitioners should be also aware of non-pharmacological interventions by reducing exposure to allergens like dust mites and pet dander, air pollution and Environmental Tobacco Smoke (ETS). It also mentions that Primary care practices should ensure that they have trained professionals and an environment conducive to provide supported self-management and involve community workers to support clinical teams in deprived and/or ethnic minority communities. Self-management education, supported by a written personalised asthma action plan, should be offered to all patients on general practice 'active asthma' registers.

The socio-environmental component would largely be less relevant in a clinical guideline yet the multifactorial nature of asthma is recognised. There appears to be an small disconnect with the socio-environmental realities existing as demonstrated from the logic model mechanisms. To prevent pitfalls associated with fixes that fail, a

number of recommendations for policy makers and practitioners are proposed with regards to management of asthma at the Primary Care level.

The immediate environment an individual with asthma is exposed to and relates to the home and neighbourhood characteristics more importantly. It was seen that patients residing in deprived neighbourhoods have complex problems that would range from comorbid conditions to drug abuse, overcrowding, poor housing quality, damp homes and the most common feature which was the presence of indoor tobacco smoke indoors as either the patients themselves were smokers or the children had parents who smoked. A first step at the practitioner level would be to recognise the complex backgrounds deprived patients with asthma come from and tailor approaches that were best suited to the patient in the management of asthma being 'social prescribers' instilling confidence that their situation would get better if they made minor adjustments one step at a time.

The case study revealed a lot of insights into the management of asthma. Being a General Practitioner myself, I felt that though the GPs and Nurses are doing their best with the best available resources, they also wanted a proactive involvement of the patients who were ready to take care of their health with adequate support. Gathering from the perspectives of the GPs and Nurses, they were aware of some of the problems their patients faced but they were also aware that most patients from deprived backgrounds were not taking their condition seriously (poor self-management uptake, culture of smoking). A sense of complacency had crept in the GPs and Nurses and that they were just going ahead with their days doing their job and trying to improve the patient's asthma without the active involvement of the patient. There was also a lack of

cooperation seen between the GPs, Practices Nurses on one side and the Community Health Nurses on the other.

As the guidelines suggested, cooperation between the Practitioners and Community workers was vital for even active self-management to succeed and a proactive approach from all the stake holders involved at the General Practice could reduce much of the burden. A multi-disciplinary working approach especially in deprived area settings with good communication links within the General Practice was vital.

Air pollution was not a major trigger that emerged from the external environmental triggers, but indoor triggers like mould and tobacco smoke were major factors that, seen from the perceptions of the GPs, Practice nurses and Housing Manager, were characteristics of factors present in high deprivation areas. Despite the focus to prevent smoking through public campaigns and improve housing standards as stated by the Housing manager at the Council, patients from Litchville were apparently not forthcoming in improving their condition as they had not considered asthma to be an important disease. Helping them to recognise that they were only worsening their condition and providing adequate support that can be tailored for each individual would be beneficial.

It needs to be noted that there should not be too great an emphasis on identifying people who are “deprived” but the focus should be placed on those at greatest risk of developing asthma or worsening their condition regardless of their socioeconomic background. But deprivation and high risk behaviour for asthma go hand-in-hand and, just as there are people who have asthma and take care of their health, there are also people who greater risk of developing or worsening their asthma.

At the organisational level, reducing patient overload in overwhelmed practices by the appointment of new staff or increasing practice working hours with additional staff in high deprivation areas could reduce some of the burden. It is right to acknowledge that the Health Boards may also be functioning with a tight budget. Increasing patient contact time for consultations and a sympathetic approach to understand the background that the patient comes from would prove beneficial and might improve patient medication adherence, self-management uptake and attendance for regular reviews.

The absence of the support groups at the primary care level and focus of the health board to achieve better clinical management has not shown much improvement despite revised clinical guidelines (BTS Steps). There is a need to take a step back and reflect what is actually going on what was happening at the primary care.

External environmental events like sudden weather changes or severe cold outbreaks can exacerbate asthma and it is important to note the frequency of these transitions as it may be a predictor for the worsening of asthma in individuals irrespective of the backgrounds they come from.

It can be seen that asthma presents as disease a broader implication for other disciplines e.g. for geographers, planners, architects, social care (place-based specialists) and there would be implications if this is an understudied area. There is still research needed to know more about the mechanisms that link social, physical, biological, emotional, historical and cognitive elements in terms of causation and control of asthma management and outcomes.

6.6 Future Research

There is huge potential for follow up research in this area as the time frame of the current study prevented exploring patient perspectives and their approach to management strategies. A study that incorporates qualitative methods and GIS mapping of participants from both case study areas would permit exploration of the different environments they were exposed to, tracing their everyday life interactions and understand their attitudes to management strategies in place especially adherence to medications and self-management plans. It would also be interesting to understand if the patients' attitudes and perspectives varied from the two different deprivation areas and tallied with the perspectives offered by the Practitioners they interacted with for the management of asthma. There is a dearth of information about the mechanisms involved that link socio-environmental characteristics and processes to management and outcomes in asthma.

This research has looked at asthma as a disease with socio-environmental contexts yet the methodology adopted could be used in researching other diseases that share the same contexts like COPD, Cardio vascular diseases and Cancer.

The conclusions from the thesis is discussed next.

6.7 Conclusion

The research started with the aim to understand the nature and role of the socio-environmental context in relation to the prevalence and management of asthma at Scottish General Practices. The key focus of the research is the way that health professionals (and related stakeholders) understand the factors that shape the causation and prevalence of asthma (including social and environmental contexts), and how this in turn shapes their management of the condition in their practice. Was it important to consider this context in the management of asthma at Scottish General Practices? If so, why?

The crude prevalence of asthma in Scotland has been on the rise and this research has revealed the inherent gaps existing that may be some of the reasons that the burden of disease has been severe. The literature review was undertaken to explore the connections/linkages between the socio-environmental context and health with a particular emphasis on asthma and the healthcare responses to asthma management. Starting at a broader scale, the review looked into the role played by "health and place" contexts in shaping health in general and narrowed down specifically to understand how the different factors that formed a part of this context had the potential to shape the prevalence and management of asthma. The review helped to identify the most common socio-environmental factor studied upon i.e. deprivation, highlight the importance of asthma-place relationships in the context of this research responding to Research Question 1 in this thesis. The contribution of this chapter to the overall thesis was to show the importance of integrating place contexts in relation to asthma research gave insights into asthma-place contextual factors ranging from the

socio-environmental triggers to disease management approaches that built into the context for a complex disease like asthma.

The methodological approaches adopted provided a framework for data exploration, integration, analysis and interpretation in this thesis. The importance of integrating an interdisciplinary approach at the intersection of social sciences (e.g. Geography) and applied health sciences (e.g. Public health) and adopting multiple methods to gather and analyse the data for this thesis contributed to recognise the importance of a multi-disciplinary approach to the study of asthma (to capture the multiple factors that shape asthma prevalence and management).

The quantitative analysis in Chapter Four was undertaken to understand the asthma – place contexts relationship in relation to deprivation by critically exploring the conventional approaches to examine asthma prevalence and management against deprivation indices from the literature and explore what they tell us about this relationship. To help illustrate and elaborate on this aspect, this chapter includes an empirical analysis which corresponded to Research Question 2 of this thesis, comparing the relationship of asthma prevalence with a deprivation index pertinent to the Scottish context (SIMD) utilising a secondary data set of a UK wide asthma audit. The overall contribution of this chapter is the understanding of what a conventional deprivation measure does/ does not reveal about asthma–place contexts and helped to advance the research into the next stage.

Corresponding to Research Question 3 in this thesis, the case study phase utilised in-depth semi-structured interviews with stakeholders involved in asthma care and management to examine their perceptions of the socio-environmental factors shaping

asthma prevalence and management at Scottish General Practices. The distinct contribution of this case study to the thesis was that it gave insights on how health professionals perceived their area, patient population and how they integrated this perceptions it into their practice as their understanding or lack of understanding or their inability to act upon their understanding of the importance of the socio-environmental context was one of key factors that shapes their management of asthma.

The research highlighted the difficulty in encouraging patients to become actively involved in taking care of their own health through self-management only part of the problem that exists in the context of asthma. It also revealed that stakeholders should actively try to understand a person's life circumstances and priorities as that may have a much bigger impact on the person's health and life than medications alone. The Health Boards are proactive to promote clinical guidelines yet still fail to acknowledge the simple practical barriers that both practitioners and patients face to reduce the risk of ill health especially asthma.

Given the disjuncture that exists between the implementation of national level asthma plans, and the realities of the local context especially with deprivation being a major factor, it is essential that new approaches to tackle asthma need to address these issues. At the organizational level, integrating health and social care services (which is now very much on the agenda in Scotland and the UK) would be beneficial for a disease like asthma as it requires long term care and support from both the clinical and social care perspective. The policy bodies that create guidelines would need to recognise the importance of the socio-environmental contexts individuals with asthma

are exposed to explicitly as not everyone would roughly have the same exposure, vulnerability or disease consequences for the better management of the disease. One way forward is the need for a greater inter-agency coordination (General Practices, Community health services, asthma support groups and Health Boards) in a system which is flexible enough to also involve experts from other areas like social care workers, psychologists, place-based specialists e.g. geographers, architects, planners to tackle the wider issues associated with asthma. Shared resources and accountability improve coordination across the different stakeholders to implement a population based asthma strategy. Policy that promotes a common vision to address asthma, ensuring seamless communication and coordination between the various stakeholders across organisations, seeking funds collaboratively and addressing asthma at the individual, community, and environmental levels would help in new care models for asthma to emerge that links the clinical, social, community and public health aspects.

Low self-esteem and low health expectations due to life circumstances (cormobidities, poverty, addictions) were one of the main factors that were perceived to negatively impact a patient's ability to self-manage asthma. If there is a coordinated effort to provide remedial services targeted at these aspects in a patient for e.g. by the health practitioner, psychologist and social care worker, it may bring about positive impacts in the individual and in turn better management of their asthma. This approach also takes into consideration that to address the non-clinical factors associated with asthma, it will require a shift from a system that emphasises focus, solely on clinical care to a holistic one that acknowledges the overall health and wellbeing of the individual too. The thesis addressed how the socio-environmental context is taken into consideration when patients with asthma are managed at General Practices. The

methodologies were chosen to deconstruct the “Socio-environmental context” within asthma management from an interdisciplinary perspective of Geography and Public Health. This was a unique approach and the quantitative analysis and the case studies helped to reconceptualise asthma management for better outcomes.

Bibliography

Acheson, 1998. The independent inquiry into inequalities in health. *BMJ : British Medical Journal*, 317(7171), pp.1465–1466.

Adams, R.J. et al., 2004. Psychological factors and asthma quality of life: a population based study. *Thorax*, 59(11), pp.930–5. Available at: http://thorax.bmj.com/content/59/11/930.short [Accessed September 5, 2015].

Adams, R.J., Smith, B.J. & Ruffin, R.E., 2001. Impact of the physician's participatory style in asthma outcomes and patient satisfaction. *Annals of allergy, asthma & immunology : official publication of the American College of Allergy, Asthma, & Immunology*, 86(3), pp.263–71. Available at: http://www.sciencedirect.com/science/article/pii/S1081120610632966 [Accessed April 1, 2014].

Adler, N.E. et al., 1993. Socioeconomic inequalities in health: no easy solution. *Jama*, 269(24), pp.3140–3145.

Adler, N.E. & Snibbe, A.C., 2003. The role of psychosocial processes in explaining the gradient between socioeconomic status and health. *Current Directions in Psychological Science*, 12(4), pp.119–123.

Althuis, M.D., Sexton, M. & Prybylski, D., 1999. Cigarette smoking and asthma symptom severity among adult asthmatics. *Journal of Asthma*, 36(3), pp.257–264.

Amuzu, A. et al., 2009. Influence of area and individual lifecourse deprivation on health behaviours: findings from the British Women's Heart and Health Study. *European journal of cardiovascular prevention & rehabilitation*, 16(2), pp.169–173.

Anderton, D.L. et al., 1994. Hazardous Waste Facilities Environmental Equity Issues in Metropolitan Areas. *Evaluation Review*, 18(2), pp.123–140.

Apter, A.J., 2010. Communities and health: the case of inner-city violence and asthma. *LDI issue brief*, 16(1), pp.1–4. Available at: http://www.ncbi.nlm.nih.gov/pubmed/20939146.

Apter, A.J. et al., 2013. The association of health literacy with adherence and outcomes in moderate-severe asthma. *The Journal of allergy and clinical immunology*, 132(2), pp.321–7. Available at: http://www.ncbi.nlm.nih.gov/pubmed/23591273 [Accessed January 29, 2014].

Archer, M., 1998. *Critical Realism: Essential Readings*, Routledge. Available at: http://books.google.co.uk/books/about/Critical_Realism.html?id=TEn-6cI171cC&pgis=1 [Accessed May 2, 2014].

Arif, A.A. & Shah, S.M., 2007. Association between personal exposure to volatile organic compounds and asthma among US adult population. *International archives of occupational and environmental health*, 80(8), pp.711–719.

Arlian, L., 2001. Dust mites: Update on their allergens and control. *Current Allergy and Asthma Reports*, 1(6), pp.581–586. Available at: http://dx.doi.org/10.1007/s11882-001-0069-4.

Aroni, R. et al., 2004. Enhancing validity: what counts as an asthma attack? *The Journal of asthma : official journal of the Association for the Care of Asthma*, 41(7), pp.729–37. Available at: http://www.ncbi.nlm.nih.gov/pubmed/15584632 [Accessed April 21, 2014].

Arundel, A. V et al., 1986. Indirect health effects of relative humidity in indoor environments. *Environmental Health Perspectives*, 65, pp.351–361. Available at: http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1474709/.

Ashworth, M. et al., 2007. The relationship between social deprivation and the quality of primary care: a

national survey using indicators from the UK Quality and Outcomes Framework. *The British journal of general practice : the journal of the Royal College of General Practitioners*, 57(539), pp.441–8. Available at: http://bjgp.org/content/57/539/441.abstract [Accessed January 5, 2016].

Asthma UK, 2013. Asthma UK Action Plan.

Asthma UK, 2011. No Title. *Asthma UK*. Available at: http://www.asthma.org.uk/asthma-facts-and-statistics.

Audit Scotland, 2012. Health inequalities in Scotland. , (December).

Austin et al, 2004. Childhood asthma in the highlands of Scotland - Morbidity and school absence. *Scottish Medical Journal*, 49(1), pp.18–21. Available at: http://www.embase.com/search/results?subaction=viewrecord&from=export&id=L38325271\nhttp://rd8hp6du2b.search.serialssolutions.com?sid=EMBASE&issn=00369330&id=doi:&atitle=Childhood+asthma+in+the+highlands+of+Scotland+-+Morbidity+and+school+absence&stitle=S.

Austin, J.B., 2005. Deprivation, smoking, and quality of life in asthma. *Archives of Disease in Childhood*, 90(3), pp.253–257. Available at: http://adc.bmj.com/cgi/doi/10.1136/adc.2004.049346.

Austin, J.B. et al., 2005. Deprivation, smoking, and quality of life in asthma. *Archives of disease in childhood*, 90(3), pp.253–7. Available at: http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=1720293&tool=pmcentrez&rendertype=abstract [Accessed March 11, 2013].

Baker, D.W., 2006. The Meaning and the Measure of Health Literacy. *Journal of General Internal Medicine*, 21(8), pp.878–883. Available at: http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1831571/.

Bancroft, A. et al., 2003. "It's like an addiction first thing... afterwards it's like a habit": daily smoking behaviour among people living in areas of deprivation. *Social science & medicine*, 56(6), pp.1261–1267.

Barlow, J. H., Sturt, J., & Hearnshaw, H. (2002). Self-management interventions for people with chronic conditions in primary care: examples from arthritis, asthma and diabetes. *Health Education Journal*, *61*(4), 365–378.

Barton, C.A. et al., 2005. Caregivers' use of, and attitudes towards, written asthma action plans in North-West Melbourne. *Primary care respiratory journal : journal of the General Practice Airways Group*, 14(3), pp.143–6. Available at: http://www.sciencedirect.com/science/article/pii/S1471441804001501 [Accessed April 22, 2014].

Barton, J. et al., 1982. Social image factors as motivators of smoking initiation in early and middle adolescence. *Child Development*, pp.1499–1511.

Basagaña, X. et al., 2004. Socioeconomic status and asthma prevalence in young adults: the European Community Respiratory Health Survey. *American journal of epidemiology*, 160(2), pp.178–88. Available at: http://www.ncbi.nlm.nih.gov/pubmed/15234940 [Accessed March 11, 2013].

Basagaña, X. & Sunyer, J., 2004. Socioeconomic Status and Asthma Prevalence in Young Adults The European Community Respiratory Health Survey. *American journal of …*, 160(2), pp.178–188. Available at: http://aje.oxfordjournals.org/content/160/2/178.short [Accessed December 10, 2014].

Bateman, E.D. et al., 2004. Can guideline-defined asthma control be achieved? The Gaining Optimal Asthma ControL study. *American journal of respiratory and critical care medicine*, 170(8), pp.836–44. Available at: http://www.ncbi.nlm.nih.gov/pubmed/15256389 [Accessed March 20, 2014].

Bateman, E.D. et al., 2007. Rate of response of individual asthma control measures varies and may overestimate asthma control: an analysis of the goal study. *The Journal of asthma : official journal of the Association for the Care of Asthma*, 44(8), pp.667–73. Available at: http://www.ncbi.nlm.nih.gov/pubmed/17943579 [Accessed April 1, 2014].

Bazeley, P., 2004. Issues in Mixing Qualitative and Quantitative Approaches to Research. *Applying*

qualitative methods to marketing management research. UK: Palgrave Macmillan, pp141-156., pp.1–11.

BBC, 2013. Scotland's most polluted streets revealed. Available at: http://www.bbc.co.uk/news/uk-scotland-21307075.

BBC, 2016. UK air pollution 'linked to 40,000 early deaths a year. Available at: http://www.bbc.co.uk/news/health-35629034 [Accessed February 23, 2016].

Beaglehole, R. et al., 2011. UN High-Level Meeting on Non-Communicable Diseases: addressing four questions. *Lancet*, 378(9789), pp.449–55. Available at: http://www.ncbi.nlm.nih.gov/pubmed/21665266 [Accessed March 26, 2014].

Beard, J.R. et al., 2009. Neighborhood characteristics and change in depressive symptoms among older residents of New York City. *American Journal of Public Health*, 99(7), p.1308.

Beasley, R., Cushley, M. & Holgate, S.T., 1989. A self-management plan in the treatment of adult asthma. *Thorax*, 44(3), pp.200–4. Available at: http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=461753&tool=pmcentrez&rendertype=abstract.

Beck, S. a et al., 2010. How will area regeneration impact on health? Learning from the GoWell study. *Public health*, 124(3), pp.125–30. Available at: http://www.ncbi.nlm.nih.gov/pubmed/20207381 [Accessed August 24, 2015].

van Beerendonk, I. et al., 1998. Assessment of the inhalation technique in outpatients with asthma or chronic obstructive pulmonary disease using a metered-dose inhaler or dry powder device. *Journal of Asthma*, 35(3), pp.273–279.

Bender, B.G., 2012. Risk Taking, Depression, Adherence, and Symptom Control in Adolescents and Young Adults with Asthma. *American Journal of Respiratory and Critical Care Medicine*. Available at: http://www.atsjournals.org/doi/abs/10.1164/rccm.200511-1706PP#.VgJiAd9Viko [Accessed September 23, 2015].

Berkman, L.F. et al., 2000. From social integration to health: Durkheim in the new millennium. *Social science & medicine*, 51(6), pp.843–857.

Blackburn, C., 1991. *Poverty and Health: Working with Families.*, ERIC.

Blanc, P.D. et al., 2006. Area-level socio-economic status and health status among adults with asthma and rhinitis. *The European respiratory journal*, 27(1), pp.85–94. Available at: http://www.ncbi.nlm.nih.gov/pubmed/16387940 [Accessed October 17, 2013].

Bornehag, C.G. et al., 2001. Dampness in buildings and health. Nordic interdisciplinary review of the scientific evidence on associations between exposure to "dampness" in buildings and health effects (NORDDAMP). *Indoor Air*, 11(2), pp.72–86.

Bosley, C.M., Fosbury, J.A. & Cochrane, G.M., 1995. The psychological factors associated with poor compliance with treatment in asthma. *European Respiratory Journal*, 8(6), pp.899–904.

Boulet, L.-P. et al., 2002. Evaluation of asthma control by physicians and patients: comparison with current guidelines. *Canadian respiratory journal : journal of the Canadian Thoracic Society*, 9(6), pp.417–23. Available at: http://europepmc.org/abstract/MED/12522488 [Accessed April 1, 2014].

Boyle, P.J., Gatrell, a C. & Duke-Williams, O., 2001. Do area-level population change, deprivation and variations in deprivation affect individual-level self-reported limiting long-term illness? *Social science & medicine (1982)*, 53(6), pp.795–9. Available at: http://www.ncbi.nlm.nih.gov/pubmed/11511054.

Breysse, P.N. et al., 2010. Indoor air pollution and asthma in children. *Proceedings of the American Thoracic Society*, 7(2), pp.102–6. Available at:

http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=3266016&tool=pmcentrez&rendertype=abstract [Accessed August 19, 2013].

British Thoracic Society, 2012a. British Guideline on the Management of Asthma.Guideline No.101. Available at: http://www.sign.ac.uk/pdf/sign101.pdf.

British Thoracic Society, 2009. British Guidelines on the Management of Asthma. Available at: http://www.sign.ac.uk/guidelines/fulltext/101/contents.html.

British Thoracic Society, 2012b. BTS Guidelines for the Management of Asthma 2012. , (January).

British Thoracic Society, 2014. SIGN 141 • British guideline on the management of asthma KEY TO EVIDENCE STATEMENTS AND GRADES OF RECOMMENDATIONS. , (October).

Brown, D. & Leyland, A.H., 2009. Population mobility, deprivation and self-reported limiting long-term illness in small areas across Scotland. *Health & place*, 15(1), pp.37–44.

Bryant-Stephens, T., 2009. Asthma disparities in urban environments. *The Journal of allergy and clinical immunology*, 123(6), pp.1199–206; quiz 1207–8. Available at: http://www.ncbi.nlm.nih.gov/pubmed/19501229 [Accessed February 27, 2013].

Burr, M.L., Verrall, C. & Kaur, B., 1997. Social deprivation and asthma. *Respiratory medicine*, 91(10), pp.603–8. Available at: http://www.ncbi.nlm.nih.gov/pubmed/9488893.

Cabana, M.D. & Flores, G., 2002. The role of clinical practice guidelines in enhancing quality and reducing racial / ethnic disparities in paediatrics. , pp.52–58.

Campbell, S.M. et al., 2001. Identifying predictors of high quality care in English general practice: observational study. *BMJ*, 323(7316), p.784. Available at: http://www.bmj.com/content/323/7316/784.abstract.

Canonica, G.W. et al., 2007. Unmet needs in asthma : Global Asthma Physician and Patient (GAPP) Survey : global adult findings. , pp.668–674.

Caress, A.-L. et al., 2002. A qualitative exploration of treatment decision-making role preference in adult asthma patients. *Health Expectations*, 5(3), pp.223–235. Available at: http://doi.wiley.com/10.1046/j.1369-6513.2002.00181.x [Accessed April 21, 2014].

Caress, A.-L. et al., 2005. Involvement in treatment decisions: what do adults with asthma want and what do they get? Results of a cross sectional survey. *Thorax*, 60(3), pp.199–205. Available at: http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=1747348&tool=pmcentrez&rendertype=abstract [Accessed April 1, 2014].

Carpenter, D.O., 2004. Clearing the Air: Asthma and Indoor Air Exposure. *Journal of the National Medical Association*, 96(8), pp.1115–1116.

Carstairs, V. & Morris, R., 1990. Deprivation and health in Scotland. *Health bulletin*, 48(4), pp.162–75. Available at: http://www.ncbi.nlm.nih.gov/pubmed/2394583 [Accessed July 20, 2014].

Carstairs, V. & Morris, R., 1989. Deprivation: explaining differences in mortality between Scotland and England and Wales. *BMJ (Clinical research ed.)*, 299(6704), pp.886–9. Available at: http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=1837760&tool=pmcentrez&rendertype=abstract.

Cartwright, A., 1991. The relationship between general practitioners, hospital consultants and community nurses when caring for people in the last year of their lives. *Family practice*, 8(4), pp.350–355.

Challis, D., 2010. Self-care and Case Management in Long-term Conditions : The Effective Management of Critical Interfaces. *Report for the National Insitute for Health Research Service Delivery and*

Organisation programme.

Chandola, T., 2012. Spatial and social determinants of urban health in low- , middle- and high-income countries 5. *Public Health*, 126(3), pp.259–261. Available at: http://dx.doi.org/10.1016/j.puhe.2011.12.008.

Chapman, K.R. et al., 2008. Suboptimal asthma control: prevalence, detection and consequences in general practice. *The European respiratory journal*, 31(2), pp.320–5. Available at: http://www.ncbi.nlm.nih.gov/pubmed/17959642 [Accessed March 20, 2014].

Chappell, N. & Funk, L., 2004. Lay perceptions of neighbourhood health. *Health and Social Care in the Community*, 12(3), pp.243–253.

Charlton, I. et al., 1990. Evaluation of peak flow and symptoms only self-management plans for control of asthma in general practice. *BMJ (Clinical research ed.)*, 301(6765), pp.1355–9. Available at: http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=1664498&tool=pmcentrez&rendertype=abstract.

Chen, E. et al., 2007. The role of the social environment in children and adolescents with asthma. *American journal of respiratory and critical care medicine*, 176(7), pp.644–9. Available at: http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=1994239&tool=pmcentrez&rendertype=abstract [Accessed October 17, 2013].

Chuang, Y.-C. et al., 2005. Effects of neighbourhood socioeconomic status and convenience store concentration on individual level smoking. *Journal of epidemiology and community health*, 59(7), pp.568–573.

Ciaccio, C.E. & Portnoy, J.M., 2009. Self-management improves asthma. *Current Allergy and Asthma Reports*, 9(6), p.411.

Clark, N. et al., 2009. Characteristics of successful asthma programs. *Public health reports (Washington, D.C. : 1974)*, 124(6), pp.797–805. Available at: http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=2773942&tool=pmcentrez&rendertype=abstract.

Clark, N. et al., 1999. Patient factors and compliance with asthma therapy. *Respiratory medicine*, 93(12), pp.856–62. Available at: http://www.ncbi.nlm.nih.gov/pubmed/10653046.

Clark, N.M. & Nothwehr, F., 2014. Self-management of asthma by adult patients. *Patient Education and Counseling*, 32, pp.S5–S20. Available at: http://www.pec-journal.com/article/S0738-3991(97)00092-X/abstract.

Cohn, R.D. et al., 2005. National Prevalence and Exposure Risk for Cockroach Allergen in U.S. Households. *Environmental Health Perspectives*, 114(4), pp.522–526. Available at: http://www.ehponline.org/ambra-doi-resolver/10.1289/ehp.8561 [Accessed August 19, 2013].

Colley, J.R.T., Douglas, J.W.B. & Reid, D.D., 1973. Respiratory disease in young adults: influence of early childhood lower respiratory tract illness, social class, air pollution, and smoking. *British Medical Journal*, 3(5873), p.195.

Connolly, C.K., Chan, N.S. & Prescott, R.J., 1989. The influence of social factors on the control of asthma. *Postgraduate medical journal*, 65(763), pp.282–5. Available at: http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=2429292&tool=pmcentrez&rendertype=abstract.

Corsico, A.G. et al., 2007. Factors affecting adherence to asthma treatment in an international cohort of young and middle-aged adults. *Respiratory medicine*, 101(6), pp.1363–7. Available at: http://www.ncbi.nlm.nih.gov/pubmed/17188854 [Accessed April 21, 2014].

Coulter, A., 1999. Paternalism or partnership? *Bmj*, 319(7212), pp.719–720.

Coutts, J.A., Gibson, N.A. & Paton, J.Y., 1992. Measuring compliance with inhaled medication in asthma. *Archives of disease in childhood*, 67(3), pp.332–333.

Creer, T.L., Renne, C.M. & Christian, W.P., 1976. Behavioral contributions to rehabilitation and childhood asthma. *Rehabilitation Literature*.

Cresswell, T., 2013. *Place: A short introduction*, John Wiley & Sons.

Creswell, J.W., 2003. *Research Design: Qualitative, Quantitative and Mixed Methods*, Sage:Thousand Oaks.

Crombie, I.K. et al., 1989. Unemployment, socio-environmental factors, and coronary heart disease in Scotland. *British heart journal*, 61(2), pp.172–177.

Cummins, S. et al., 2007. Understanding and representing "place" in health research: a relational approach. *Social science & medicine (1982)*, 65(9), pp.1825–38. Available at: http://www.ncbi.nlm.nih.gov/pubmed/17706331 [Accessed August 6, 2013].

Curtis, S. et al., 2004. Area effects on health variation over the life-course: Analysis of the longitudinal study sample in England using new data on area of residence in childhood. *Social Science and Medicine*, 58(1), pp.57–74.

Curtis, S., 2004. *Health and inequality: geographical perspectives*, Sage.

Custovic, A. et al., 1996. Exposure to house dust mite allergens and the clinical activity of asthma. *The Journal of allergy and clinical immunology*, 98(1), pp.64–72. Available at: http://linkinghub.elsevier.com/retrieve/pii/S0091674996702270?showall=true.

D'Amato, G. et al., 2005. Environmental risk factors and allergic bronchial asthma. *Clinical and experimental allergy journal of the British Society for Allergy and Clinical Immunology*, 35(9), pp.1113–1124. Available at: http://www.ncbi.nlm.nih.gov/pubmed/16164436 [Accessed March 11, 2013].

Dales, R.E., Burnett, R. & Zwanenburg, H., 1991. Adverse Health Effects Among Adults Exposed to Home Dampness and Molds1, 2.

Danermark, B., 2001. INTERDISCIPLINARY RESEARCH AND CRITICAL REALISM – THE EXAMPLE OF Many of the problems that today are at the top of the research agenda presuppose. , (June).

Dawson, B. et al., 1969. A survey of childhood asthma in Aberdeen. *Lancet (London, England)*, 1(7599), pp.827–30. Available at: http://www.ncbi.nlm.nih.gov/pubmed/4180376 [Accessed September 22, 2015].

Day, R., 2008. Local environments and older people's health: dimensions from a comparative qualitative study in Scotland. *Health & place*, 14(2), pp.299–312. Available at: http://www.ncbi.nlm.nih.gov/pubmed/17804275 [Accessed August 24, 2015].

Day, R.A., 2009. *How to Write & Publish a Scientific Paper*

Denford, S., Frost, J., Dieppe, P., Cooper, C., & Britten, N. (2014). Individualisation of drug treatments for patients with long-term conditions: a review of concepts. *BMJ Open*, *4*(3), e004172. http://doi.org/10.1136/bmjopen-2013-004172

Delamater, P.L., Finley, A.O. & Banerjee, S., 2012. An analysis of asthma hospitalizations, air pollution, and weather conditions in Los Angeles County, California. *The Science of the total environment*, 425, pp.110–8. Available at: http://www.ncbi.nlm.nih.gov/pubmed/22475217 [Accessed August 19, 2013].

Department of Health, 2002. Chronic disease management and self-care. , (August).

Department of Health, 2008. Health Inequalities: Progress and Next Steps. , I(February), pp.247–250. Available at: http://www.publications.parliament.uk/pa/cm200809/cmselect/cmhealth/286/28602.htm.

Department of Health and Ageing Australian Government, 2005. National Evaluation of the sharing Health Care Demonstration Projects Final Report – Executive Summary. , (June).

Department of Health and the Welsh Office, 1989. *General Practice in the National Health Service: A new contract London HMSO*,

Devers, K.J., 1999. How will we know "good" qualitative research when we see it? Beginning the dialogue in health services research. *Health services research*, 34(5 Pt 2), pp.1153–88. Available at: http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=1089058&tool=pmcentrez&rendertype=abstract.

Devesa, S.S. & DIAMOND, E.L., 1983. Socioeconomic and racial differences in lung cancer incidence. *American Journal of Epidemiology*, 118(6), pp.818–831.

Dickinson, H.O., 2000. Cancer trends in England and Wales. *BMJ : British Medical Journal*, 320(7239), pp.884–885.

Diette, G.B. et al., 2008. Environmental issues in managing asthma. *Respiratory care*, 53(5), pp.602–15; discussion 616–7. Available at: http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=2396450&tool=pmcentrez&rendertype=abstract.

Diez Roux, a. V., 2001. Investigating neighborhood and area effects on health. *American Journal of Public Health*, 91(11), pp.1783–1789.

Diez Roux, A. V. & Mair, C., 2010. Neighborhoods and health. *Annals of the New York Academy of Sciences*, 1186, pp.125–145.

Diez-Roux, a V et al., 1997. Neighborhood environments and coronary heart disease: a multilevel analysis. *American journal of epidemiology*, 146(1), pp.48–63.

Diez-Roux, A. V, 1998. Bringing context back into epidemiology: variables and fallacies in multilevel analysis. *American journal of public health*, 88(2), pp.216–222.

Dorling, D., 1996. Be cheerful,strive to be happy Identifying disadvanatged areas: health ,wealth and happiness. *Radical Statstics*, 286, pp.1705–9.

Dorling, D. et al., 2001. How much does place matter? *Environment and Planning A*, 33(8), pp.1335–1369.

Dow, W.H. et al., 1995. *Disease complementarities and the evaluation of public health interventions*, National Bureau of Economic Research.

Downing, A. et al., 2007. Do the UK government's new Quality and Outcomes Framework (QOF) scores adequately measure primary care performance? A cross-sectional survey of routine healthcare data. *BMC health services research*, 7, p.166. Available at: http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=2117011&tool=pmcentrez&rendertype=abstract [Accessed March 11, 2013].

Driscoll, D.L., Salib, P. & Rupert, D.J., 2007. Merging Qualitative and Quantitative Data in Mixed Methods Research : How To and Why Not. , pp.18–28.

Duerden , M. Price, D., 2001. Training issues in the use of inhalers. *Disease management and health outcomes*, 9(2), pp.75–87.

Dundee City Council, 2010. About Dundee 2010. *Dundee City Council*, (Statisics,Demographics,General Reference Material). Available at: http://www.dundeecity.gov.uk/dundeecity/uploaded_publications/publication_2005.pdf.

Dunn, J.R. & Cummins, S., 2007. Placing health in context. *Social Science and Medicine*, 65(9), pp.1821–1824.

Duran-Tauleria, E. & Rona, R., 1999. Geographical and socioeconomic variation in the prevalence of asthma symptoms in English and Scottish children. *Thorax*, pp.476–481. Available at: http://thorax.bmj.com/content/54/6/476.short [Accessed October 21, 2014].

Duran-Tauleria, E. & Rona, R.J., 1999. Geographical and socioeconomic variation in the prevalence of asthma symptoms in English and Scottish children. *Thorax*, 54(6), pp.476–81. Available at: http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=1745501&tool=pmcentrez&rendertype=abstract.

Ecob, R. & Macintyre, S., 2000. Small area variations in health related behaviours ; do these depend on the behaviour itself , its measurement , or on personal characteristics ? , 6.

Eisner, M.D. et al., 2001. Asthma and smoking status in a population-based study of California adults. *Public Health Reports*, 116(2), pp.148–157. Available at: http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1497303/.

Ellaway, A. et al., 2012. "Getting sicker quicker": does living in a more deprived neighbourhood mean your health deteriorates faster? *Health & place*, 18(2), pp.132–7. Available at: http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=3391685&tool=pmcentrez&rendertype=abstract [Accessed August 19, 2013].

Ellaway, A. & Macintyre, S., 1996. Does where you live predict health related behaviours?: a case study in Glasgow. *Health Bulletin*, 54(6), pp.443–446.

Ellaway, A., Macintyre, S. & Kearns, A., 2001. Perceptions of Place and Health in Socially Contrasting Neighbourhoods. , 38(12), pp.2299–2316.

Ellen, I.G., Mijanovich, T. & Dillman, K.N., 2003. Neighborhood effects on health: exploring the links and assessing the evidence. *Journal of Urban Affairs*, 23(3-4), pp.391–408.

Elliott, P. et al., 2001. Risk of adverse birth outcomes in populations living near landfill sites. *Bmj*, 323(7309), pp.363–368.

Evans, G.W., 1984. *Environmental stress and Health*, CUP Archive.

Evans, G.W. & Kantrowitz, E., 2002. Socioeconomic status and health: the potential role of environmental risk exposure. *Annual review of public health*, 23(Figure 1), pp.303–31. Available at: http://www.ncbi.nlm.nih.gov/pubmed/11910065 [Accessed March 26, 2014].

Evans, J. et al., 2000. An epidemiological study of the relative importance of damp housing in relation to adult health. *Journal of epidemiology and community health*, 54(9), pp.677–86. Available at: http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=1731738&tool=pmcentrez&rendertype=abstract.

Evans, R.G. & Stoddart, G.L., 2003. Consuming research, producing policy? *American Journal of Public Health*, 93(3), pp.371–379.

Feo Brito, F. et al., 2007. Air pollution and seasonal asthma during the pollen season. A cohort study in Puertollano and Ciudad Real (Spain). *Allergy*, 62(10), pp.1152–7. Available at: http://www.ncbi.nlm.nih.gov/pubmed/17845584 [Accessed August 19, 2013].

Feo Brito, F. et al., 2010. Grass pollen, aeroallergens, and clinical symptoms in Ciudad Real, Spain. *Journal of investigational allergology & clinical immunology : official organ of the International Association of Asthmology (INTERASMA) and Sociedad Latinoamericana de Alergia e Inmunología*, 20(4), pp.295–302. Available at: http://www.ncbi.nlm.nih.gov/pubmed/20815307.

Finkelstein, J. a et al., 2002. Underuse of controller medications among Medicaid-insured children with

asthma. *Archives of pediatrics & adolescent medicine*, 156(6), pp.562–7. Available at: http://www.ncbi.nlm.nih.gov/pubmed/12038888.

Fisk, W.J., Lei-Gomez, Q. & Mendell, M.J., 2007. Meta-analyses of the associations of respiratory health effects with dampness and mold in homes. *Indoor Air*, 17(4), pp.284–296. Available at: http://dx.doi.org/10.1111/j.1600-0668.2007.00475.x.

Freudenberg, N., 2000. Health promotion in the city: a review of current practice and future prospects in the United States. *Annual review of public health*, 21(1), pp.473–503.

Fullilove, M.T., 2003. Neighborhoods and infectious diseases. *Neighborhoods and health*, pp.211–222.

Gale, N.K. et al., 2013. Using the framework method for the analysis of qualitative data in multi-disciplinary health research. *BMC medical research methodology*, 13(1), p.117.

Gale, S.L. et al., 2011. Crime, neighborhood deprivation, and asthma: A GIS approach to define and assess neighborhoods. *Spatial and Spatio-temporal Epidemiology*, 2(2), pp.59–67. Available at: http://linkinghub.elsevier.com/retrieve/pii/S1877584511000025.

Galea, S., Freudenberg, N. & Vlahov, D., 2005. Cities and population health. *Social science & medicine (1982)*, 60(5), pp.1017–33. Available at: http://www.ncbi.nlm.nih.gov/pubmed/15589671 [Accessed August 24, 2015].

Gans, H.J., 1982. *Urban villagers*, Simon and Schuster.

Ganse, E. Van, Mörk, A. & Osman, L., 2003. Factors affecting adherence to asthma treatment: patient and physician perspectives. *Prim Care Resp …*, 12(2), pp.46–51. Available at: http://www.thepcrj.org/journ/vol12_2/046_051vanganse.pdf [Accessed December 9, 2014].

Ganz, M.L., 2000. The relationship between external threats and smoking in central Harlem. *American Journal of Public Health*, 90(3), p.367.

Gatrell, A.C. et al., 2000. Understanding health inequalities: Locating people in geographical and social spaces.

Gee, I.L., 2005. Indoor Air Quality, Environmental Tobacco Smoke and Asthma: A Case Control Study of Asthma in a Community Population. *Indoor and Built Environment*, 14(3-4), pp.215–219. Available at: http://ibe.sagepub.com/cgi/doi/10.1177/1420326X05054288 [Accessed August 19, 2013].

Geronimus, A.T., 1991. The weathering hypothesis and the health of African-American women and infants: evidence and speculations. *Ethnicity & disease*, 2(3), pp.207–221.

Geronimus, A.T., 2000. To mitigate, resist, or undo: addressing structural influences on the health of urban populations. *American Journal of Public Health*, 90(6), p.867.

Gesler, W.M. & Kearns, R.A., 2005. *Culture/place/health*, Routledge.

Gibson, P.G., 2004. Asthma action plans: use it or lose it. *Primary care respiratory journal : journal of the General Practice Airways Group*, 13(1), pp.17–8. Available at: http://www.ncbi.nlm.nih.gov/pubmed/16701632 [Accessed April 22, 2014].

Gibson, P.G. et al., 2003. Self-management education and regular practitioner review for adults with asthma. *The Cochrane database of systematic reviews*, (1), p.CD001117. Available at: http://www.ncbi.nlm.nih.gov/pubmed/12535399.

Gibson, P.G., 2004. Written action plans for asthma: an evidence-based review of the key components. *Thorax*, 59(2), pp.94–99. Available at: http://thorax.bmj.com/cgi/doi/10.1136/thorax.2003.011858 [Accessed April 21, 2014].

Gillissen, A., 2007. Patients' adherence in Asthma. , (1), pp.205–222.

Glasgow, N.J. et al., 2003. Proactive asthma care in childhood : general practice based randmised control trial. *BMJ*, 327(April 2000).

Global Initiative for Asthma, 2012. Global strategy for asthma management and prevention © 2012.

Goeman, D.P. et al., 2005. Bariers to delivering asthma care: a qualitative study of general practitioners. , 183(9), pp.7–10.

Goeman, D.P. et al., 2007. "You have to learn to live with it": a qualitative and quantitative study of older people with asthma. *The clinical respiratory journal*, 1(2), pp.99–105. Available at: http://www.ncbi.nlm.nih.gov/pubmed/20298288 [Accessed April 1, 2014].

Gonzalez-Barcala, F.J. et al., 2013. Influence of pollen level on hospitalizations for asthma. *Archives of environmental & occupational health*, 68(2), pp.66–71. Available at: http://www.ncbi.nlm.nih.gov/pubmed/23428055 [Accessed August 19, 2013].

Graham, H., 2009. *Understanding health inequalities*, McGraw-Hill Education (UK).

Gray, D.E., 2013. *Doing research in the real world*, Sage.

Green, B.N., Johnson, C.D. & Adams, A., 2006. Writing narrative literature reviews for peer-reviewed journals: secrets of the trade. *Journal of Chiropractic Medicine*, 5(3), pp.101–117. Available at: http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2647067/.

Greene et al, 1989. Toward a conceptual framework for mixed-methods evaluation designs. *Education Evaluation and Policy Analysis*, 11(3), pp.255–274. Available at: http://epa.sagepub.com/content/11/3/255.short.

Greene, J.C., 2008. Is Mixed Methods Social Inquiry a Distinctive Methodology? *Journal of Mixed Methods Research*, 2(1), pp.7–22. Available at: http://mmr.sagepub.com/cgi/doi/10.1177/1558689807309969 [Accessed May 8, 2014].

Griffiths, C. et al., 2004. Specialist nurse intervention to reduce unscheduled asthma care in a deprived multiethnic area: the east London randomised controlled trial for high risk asthma (ELECTRA). *BMJ (Clinical research ed.)*, 328(7432), p.144. Available at: http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=314511&tool=pmcentrez&rendertype=abstract [Accessed April 1, 2014].

Gruffydd-Jones, K. et al., 1999. Why don't patients attend the asthma clinic? *Asthma in General Practice*, 7, pp.36–38.

Guo, Y. et al., 2012. The Association between Cold Spells and Pediatric Outpatient Visits for Asthma in Shanghai , China. , 7(7).

Hammersley, M., 2001. On'systematic'reviews of research literatures: a'narrative'response to Evans & Benefield. *British educational research journal*, 27(5), pp.543–554.

Han, Y.-Y., Lee, Y.-L. & Guo, Y.L., 2009. Indoor environmental risk factors and seasonal variation of childhood asthma. *Pediatric allergy and immunology : official publication of the European Society of Pediatric Allergy and Immunology*, 20(8), pp.748–56. Available at: http://www.ncbi.nlm.nih.gov/pubmed/19236600 [Accessed August 19, 2013].

Hanlon, P., Walsh, D. & Whyte, B., 2006. Let Glasgow flourish. *Glasgow: Glasgow Centre for Population Health*, (June). Available at: http://scholar.google.com/scholar?hl=en&btnG=Search&q=intitle:"+Let+Glasgow+Flourish+"#0 [Accessed November 30, 2014].

Harburg, E. et al., 1973. Socioecological stressor areas and black-white blood pressure: Detroit. *Journal*

of Chronic Diseases, 26(9), pp.595–611.

Haughney, J. et al., 2004. The Living & Breathing Study: a study of patients' views of asthma and its treatment. *Primary care respiratory journal : journal of the General Practice Airways Group*, 13(1), pp.28–35. Available at: http://www.ncbi.nlm.nih.gov/pubmed/16701634 [Accessed August 19, 2013].

Havlicek, L.L. & Peterson, N.L., 1977. Effect of the violation of assumptions upon significance levels of the Pearson r. *Psychological Bulletin*, 84(2), p.373.

Haynes, R., 1991. Inequalities in health and health service use: evidence from the General Household Survey. *Social science & medicine*, 33(4), pp.361–368.

Haynes, R. & Gale, S., 2000. Deprivation and poor health in rural areas: inequalities hidden by averages. *Health & Place*, 6(4), pp.275–285. Available at: http://linkinghub.elsevier.com/retrieve/pii/S1353829200000095.

Healey, P., 1998. Institutionalist theory, social exclusion and governance. *Social exclusion in European cities*, pp.53–73.

Health and Social Care Information Center, 2013. Quality Outcomes Framework. Available at: http://qof.hscic.gov.uk/.

Heinrich, J., 2011. Influence of indoor factors in dwellings on the development of childhood asthma. *International journal of hygiene and environmental health*, 214(1), pp.1–25. Available at: http://www.ncbi.nlm.nih.gov/pubmed/20851050 [Accessed August 19, 2013].

Herald Scotland, 2016. Public health at risk as Scotland faces "air pollution crisis." *Herald Scotland*. Available at: http://www.heraldscotland.com/news/14210100.Public_health_at_risk_as_Scotland_faces air_pollution_crisis_/ [Accessed January 19, 2016].

Hilton, S., 1990. An audit of inhaler technique among asthma patients of 34 general practitioners. , (December), pp.0–1.

Hippisley-cox, J. et al., 2001. Do single handed practices offer poorer care? Cross sectional survey of processes and outcomes. , pp.320–323.

Horn, C.R. & Cochrane, G.M., 1989. Management of asthma in general practice. *Respiratory Medicine*, 83(1), pp.67–70. Available at: http://www.sciencedirect.com/science/article/pii/S0954611189800629 [Accessed September 23, 2015].

Horne, R. et al., 2007. Can asthma control be improved by understanding the patient ' s perspective ? , 11, pp.1–11.

Hoskins, G. et al., 2011. Assessing asthma control in UK primary care: use of routinely collected prospective observational consultation data to determine appropriateness of a variety of control assessment models. *BMC family practice*, 12(1), p.105. Available at: http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=3196897&tool=pmcentrez&rendertype=abstract [Accessed March 11, 2013].

Hoskins, G. et al., 1996. Do self-management plans reduce morbidity in patients with asthma? *The British journal of general practice : the journal of the Royal College of General Practitioners*, 46(404), pp.169–71. Available at: http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=1239578&tool=pmcentrez&rendertype=abstract.

Hoskins, G. et al., 2012a. Patient, practice and organisational influences on asthma control: observational data from a national study on primary care in the United Kingdom. *International journal of nursing studies*, 49(5), pp.596–609. Available at:

http://www.ncbi.nlm.nih.gov/pubmed/22079260 [Accessed February 4, 2014].

Hoskins, G. et al., 2012b. Patient, practice and organisational influences on asthma control: observational data from a national study on primary care in the United Kingdom. *International journal of nursing studies*, 49(5), pp.596–609. Available at: http://www.ncbi.nlm.nih.gov/pubmed/22079260 [Accessed August 19, 2013].

Hoskins, G. et al., 2005. Results of a national asthma campaign survey of primary care in Scotland. *International journal for quality in health care : journal of the International Society for Quality in Health Care / ISQua*, 17(3), pp.209–15. Available at: http://www.ncbi.nlm.nih.gov/pubmed/15831548.

Hou, F. & Myles, J., 2005. Neighbourhood inequality, neighbourhood affluence and population health. *Social Science and Medicine*, 60(7), pp.1557–1569.

Hwang, G. et al., 2012. of Public Health Risk Factors for Childhood Metropolitan and.

ISAAC, 2011. *The Global Asthma Report*,

ISD SCOTLAND, 2006. General Practice Population Data. Available at: http://www.isdscotland.org/Health-Topics/General-Practice/Workforce-and-Practice-Populations/.

ISD SCOTLAND, 2012. No Title. *ISD SCOTLAND*. Available at: http://www.isdscotland.org/Health-Topics/General-Practice/Quality-And-Outcomes-Framework/2010-11/Register-and-prevalence-data.asp.

ISD SCOTLAND, 2013. QOF Prevalance Rates. *Quality and Outcomes Framework*. Available at: http://www.isdscotland.org/Health-Topics/General-Practice/Quality-And-Outcomes-Framework/Information-for-users-of-QOF-register-and-prevalence-data.asp?C0=Y.

ISD SCOTLAND, 2014. Quality Outcomes Framework. Available at: http://www.isdscotland.org/health-Topics/General-Practice/Quality-And-Outcomes-Framework/ [Accessed May 13, 2014].

J D van Baar, H Joosten, J Car, G K Freeman, M R Partridge, C van Weel, A.S., 2006. Understanding reasons for asthma outpatient (non)- attendance and exploring the role of telephone and e-consulting in facilitating access to care: exploratory qualitative study. , pp.191–195.

Jarman, B., 1983. Identification of underprivileged areas. *British medical journal (Clinical research ed.)*, 286(6379), pp.1705–1709.

Jenkins, C. & Campbell, J., 1996. Catchment areas in general practice and their relation to size and quality of practice and deprivation: a descriptive study in one London borough. *BMJ (Clinical research ed.)*, 313(7066), pp.1189–92. Available at: http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=2352502&tool=pmcentrez&rendertype=abstract.

Jenkins, C.D., 1983. Social environment and cancer mortality in men. *New England Journal of Medicine*, 308(7), pp.395–398.

Jerant, A.F., von Friederichs-Fitzwater, M.M. & Moore, M., 2005. Patients' perceived barriers to active self-management of chronic conditions. *Patient education and counseling*, 57(3), pp.300–7. Available at: http://www.sciencedirect.com/science/article/pii/S0738399104002605 [Accessed July 17, 2015].

Jie, Y. et al., 2011. Do indoor environments influence asthma and asthma-related symptoms among adults in homes?: a review of the literature. *Journal of the Formosan Medical Association = Taiwan yi zhi*, 110(9), pp.555–63. Available at: http://www.ncbi.nlm.nih.gov/pubmed/21930065 [Accessed August 19, 2013].

Jordan, K.P. et al., 2014. The relationship of individual and neighbourhood deprivation with morbidity in older adults: An observational study. *European Journal of Public Health*, 24(3), pp.396–398.

Juniper, E.F. et al., 1990. Effect of long-term treatment with an inhaled corticosteroid (budesonide) on airway hyperresponsiveness and clinical asthma in nonsteroid-dependent asthmatics. *American Review of Respiratory Disease*, 142(4), pp.832–836.

Kawachi, I. & Subramanian, S. V, 2007. Neighbourhood influences on health. *Community Health*, (April 2009), pp.2007–2009.

Kearns, A. & Parkinson, M., 2001. The significance of neighbourhood. *Urban studies*, 38(12), pp.2103–2110.

Kearns, R. & Moon, G., 2002. From medical to health geography: novelty, place and theory after a decade of change. *Progress in Human Geography*, 26(2), pp.605–625.

Kearns, R.A., 1993. Place and health: towards a reformed medical geography*. *The Professional Geographer*, 45(2), pp.139–147.

Kearns, R.A. & Gesler, W.M., 1998. *Putting health into place: landscape, identity, and well-being*, Syracuse University Press.

Khatri, S.B. et al., 2009. Association of Ambient Ozone Exposure with Airway Inflammation and Allergy in Adults with Asthma. , pp.777–785.

Kieckhefer, G.M.M.R., 2000. What parents of children with asthma tell us. *Journal of Pediatric Health Care*, 14(3), pp.0122–0126. Available at: http://www1.mosby.com/scripts/om.dll/serve?action=searchDB&searchDBfor=art&artType=abs&id=a103955 [Accessed April 1, 2014].

Kim, D., 2008. Blues from the neighborhood? Neighborhood characteristics and depression. *Epidemiologic reviews*, 30(1), pp.101–117.

King, G. et al., 2003. Smoking in Cape Town: Community influences on adolescent tobacco use. *Preventive medicine*, 36(1), pp.114–123.

Kleinschmidt, I., Hills, M. & Elliott, P., 1995. Smoking behaviour can be predicted by neighbourhood deprivation measures. , 49(Suppl 2), pp.72–77.

Kling, J.R., Liebman, J.B. & Katz, L.F., 2007. Experimental analysis of neighborhood effects. *Econometrica*, 75(1), pp.83–119.

Knox, P.L. & Marston, S.A., 2013. *Human geography: Places and regions in global context*, Pearson.

Kobza, J., 2015. Socio-Economic Determinants and Population Health in the Context of Environmental Risk Exposure. *Synergic Influence of Gaseous, Particulate, and Biological Pollutants on Human Health*, p.265.

Krieger, J. & Higgins, D.L., 2002. Housing and health: time again for public health action. *American journal of public health*, 92(5), pp.758–768.

Laforest, L. et al., 2007. Asthmatic patients' poor awareness of inadequate disease control: a pharmacy-based survey. *Annals of allergy, asthma & immunology : official publication of the American College of Allergy, Asthma, & Immunology*, 98(2), pp.146–52. Available at: http://www.sciencedirect.com/science/article/pii/S1081120610606874 [Accessed August 28, 2014].

Last, J.M. & Association, I.E., 2001. *A dictionary of epidemiology*, Oxford Univ Press.

Laurent, O. et al., 2008. Air Pollution, Asthma Attacks, and Socioeconomic Deprivation: A Small-Area Case-Crossover Study. *American Journal of Epidemiology*, 168(1), pp.58–65. Available at:

http://aje.oxfordjournals.org/cgi/doi/10.1093/aje/kwn087.

Lee, R.E. & Cubbin, C., 2002. Neighborhood Context and Youth Cardiovascular Health Behaviors. *American Journal of Public Health*, 92(3), pp.428–436. Available at: http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1447094/.

Leon, D.A. et al., 2003. Understanding the health of Scotland's population in an international context. *A review of current approaches, knowledge and recommendations for new research directions. London: London School of Hygiene & Tropical Medicine and Public Health Institute of Scotland*.

Leventhal, T. & Brooks-Gunn, J., 2000. The neighborhoods they live in: The effects of neighborhood residence on child and adolescent outcomes. *Psychological Bulletin*, 126(2), pp.309–337. Available at: http://doi.apa.org/getdoi.cfm?doi=10.1037/0033-2909.126.2.309 [Accessed August 20, 2014].

Leviton, L.C., Snell, E. & McGinnis, M., 2000. Urban issues in health promotion strategies. *American Journal of Public Health*, 90(6), p.863.

Lindfors, A. et al., 1995. Indoor environmental risk factors in young asthmatics: a case-control study. *Archives of disease in childhood*, 73(5), pp.408–12. Available at: http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=1511369&tool=pmcentrez&rendertype=abstract.

Lindsay, C., McCracken, M. & McQuaid, R.W., 2003. Unemployment duration and employability in remote rural labour markets. *Journal of rural studies*, 19(2), pp.187–200.

Lorig, K.R. & Holman, H., 2003. Self-management education: history, definition, outcomes, and mechanisms. *Annals of behavioral medicine : a publication of the Society of Behavioral Medicine*, 26(1), pp.1–7. Available at: http://www.ncbi.nlm.nih.gov/pubmed/12867348 [Accessed April 4, 2015].

Lozano, P. et al., 2003. Asthma medication use and disease burden in children in a primary care population. *Archives of pediatrics & adolescent medicine*, 157(1), pp.81–8. Available at: http://www.ncbi.nlm.nih.gov/pubmed/12517200.

Luevano, S.F., Garcia, J.H. & Sarnat, J.A., 2012. Research | Children ' s Health Air Pollution and Acute Respiratory Response in a Panel of Asthmatic. , 120(3), pp.437–444.

Macintyre, S., 2007. Deprivation amplification revisited; or, is it always true that poorer places have poorer access to resources for healthy diets and physical activity? *International Journal of Behavioral Nutrition and Physical Activity*, 4(1), p.32.

Macintyre, S. & Ellaway, A., 2000. Ecological approaches: rediscovering the role of the physical and social environment. *Social epidemiology*, pp.332–348.

Macintyre, S., Ellaway, A. & Cummins, S., 2002. Place effects on health : how can we conceptualise , operationalise and measure them ? , 55, pp.125–139.

Macintyre, S., Macdonald, L. & Ellaway, A., 2008. Do poorer people have poorer access to local resources and facilities? The distribution of local resources by area deprivation in Glasgow, Scotland. *Social Science and Medicine*, 67(6), pp.900–914. Available at: http://dx.doi.org/10.1016/j.socscimed.2008.05.029.

Macintyre, S., Maciver, S. & Sooman, A., 1993. Area, Class and Health: Should we be Focusing on Places or People? *Journal of Social Policy*, 22(02), p.213.

Macintyre, S., MacIver, S. & Sooman, A., 1993. Area, class and health: should we be focusing on places or people? *Journal of social policy*, 22(02), pp.213–234.

Mackenbach, J.P. & Bakker, M.J., 2003. Tackling socioeconomic inequalities in health: analysis of European experiences. *The Lancet*, 362(9393), pp.1409–1414.

Macleod, U. et al., 2004. Comorbidity and socioeconomic deprivation: an observational study of the prevalence of comorbidity in general practice. , (April 2003), pp.24–26.

Mair, C., Diez Roux, A. V & Morenoff, J.D., 2010. Neighborhood stressors and social support as predictors of depressive symptoms in the Chicago Community Adult Health Study. *Health & Place*, 16(5), pp.811–819. Available at: http://dx.doi.org/10.1016/j.healthplace.2010.04.006.

Malveaux, F.J. & Fletcher-Vincent, S. a, 1995. Environmental risk factors of childhood asthma in urban centers. *Environmental health perspectives*, 103 Suppl (10), pp.59–62. Available at: http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=1518936&tool=pmcentrez&rendertype=abstract.

Marmot, M., 2015. *The health gap: the challenge of an unequal world*, Bloomsbury Publishing USA.

Marsh, A. et al., 2000. Housing Deprivation and Health: A Longitudinal Analysis. *Housing Studies*, 15(3), pp.411–428.

Marsh, S. et al., 2006. Smoking and COPD: What really are the risks? [1]. *European Respiratory Journal*, 28(4), pp.883–884.

Masoli, M. et al., 2004. The global burden of asthma: Executive summary of the GINA Dissemination Committee Report. *Allergy: European Journal of Allergy and Clinical Immunology*, 59(5), pp.469–478.

McGowan, P., 2005. Self-management: a Background Paper. *New Perspectives: International Conference on Patient Self-management*, pp.1–10.

McKinstry, B., 2000. Do patients wish to be involved in decision making in the consultation? A cross sectional survey with video vignettes. *BMJ : British Medical Journal*, 321(7265), pp.867–871. Available at: http://www.ncbi.nlm.nih.gov/pmc/articles/PMC27496/.

McLean, G. et al., 2008. Practice postcode versus patient population: a comparison of data sources in England and Scotland. *International journal of health geographics*, 7, p.37. Available at: http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=2490685&tool=pmcentrez&rendertype=abstract [Accessed August 19, 2013].

McLean, G., Guthrie, B. & Sutton, M., 2007. Differences in the quality of primary medical care services by remoteness from urban settlements. *Quality & Safety in Health Care*, 16(6), pp.446–449. Available at: http://www.scopus.com/inward/record.url?eid=2-s2.0-37749041422&partnerID=tZOtx3y1\nhttp://search.ebscohost.com/login.aspx?direct=true&db=cin20&AN=2009756287&site=ehost-live.

McLoone, P. & Boddy, F. a, 1994. Deprivation and mortality in Scotland, 1981 and 1991. *BMJ (Clinical research ed.)*, 309(6967), pp.1465–70. Available at: http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=2541651&tool=pmcentrez&rendertype=abstract.

McNeill, J.R., 2001. *Something new under the sun: An environmental history of the twentieth-century world (the global century series)*, WW Norton & Company.

Meade, M.S., 1988. *Medical geography*, Wiley Online Library.

Meadows, P., 1995. Variation of Diabetes Mellitus Prevalence in General Practice and Its Relation to Deprivation. *Diabetic Medicine*, 12(8), pp.696–700. Available at: http://dx.doi.org/10.1111/j.1464-5491.1995.tb00572.x.

Mercer, S.W. & Watt, G.C.M., 2007. The inverse care law: clinical primary care encounters in deprived and affluent areas of Scotland. *The Annals of Family Medicine*, 5(6), pp.503–510.

Meyer Balter et al., 2008. Asthma worsenings : Approaches to prevention and management from the

Asthma Worsenings Working Group. , 15(December), pp.1–19.

Mielck, a, Reitmeir, P. & Wjst, M., 1996. Severity of childhood asthma by socioeconomic status. *International journal of epidemiology*, 25(2), pp.388–93. Available at: http://www.ncbi.nlm.nih.gov/pubmed/9119565.

Miles, M.B. & Huberman, A.M., 1994. *Qualitative data analysis: An expanded sourcebook*, Sage.

Mitchell, G. & Dorling, D., 2003. An environmental justice analysis of British air quality. *Environment and planning A*, 35(5), pp.909–929.

Mitchell, R. et al., 2000. Do attitude and area in ¯ uence health ? A multilevel approach to health inequalities. , 6, pp.67–79.

Mitchell, R. & Popham, F., 2008. Effect of exposure to natural environment on health inequalities: an observational population study. *The Lancet*, 372(9650), pp.1655–1660. Available at: http://dx.doi.org/10.1016/S0140-6736(08)61689-X.

Mitchell, R.G. & Dawson, B., 1973. Educational and social characteristics of children with asthma. *Archives of Disease in Childhood*, 48(6), pp.467–471. Available at: http://adc.bmj.com/cgi/doi/10.1136/adc.48.6.467.

Moffat, M. et al., 2007. Poor communication may impair optimal asthma care: a qualitative study. *Family practice*, 24(1), pp.65–70. Available at: http://www.ncbi.nlm.nih.gov/pubmed/17158184 [Accessed December 4, 2014].

Molimard, M. & Le Gros, V., 2008. Impact of patient-related factors on asthma control. *The Journal of asthma : official journal of the Association for the Care of Asthma*, 45(2), pp.109–13. Available at: http://www.ncbi.nlm.nih.gov/pubmed/18350401 [Accessed April 21, 2014].

Moosa, S.E. & Henley, L.D., 1997. An evaluation of parental knowledge of childhood asthma in a family practice setting. *South African medical journal = Suid-Afrikaanse tydskrif vir geneeskunde*, 87(1), pp.42–5. Available at: http://europepmc.org/abstract/MED/9063312/reload=0 [Accessed April 1, 2014].

Morgan, C.L.I., Ahmed, Z. & Kerr, M.P., 2000. Social deprivation and prevalence of epilepsy and associated health usage. *Journal of Neurology, Neurosurgery & Psychiatry* , 69 (1), pp.13–17. Available at: http://jnnp.bmj.com/content/69/1/13.abstract.

Morris, R. & Carstairs, V., 1991. Which deprivation? A comparison of selected deprivation indexes. *Journal of public health medicine*, 13(4), pp.318–26. Available at: http://www.ncbi.nlm.nih.gov/pubmed/1764290.

Mortimer, K.M. et al., 2002. The effect of air pollution on inner-city children with asthma. *European respiratory journal*, 19(4), pp.699–705.

Murray, C.J.L. et al., 2012. Disability-adjusted life years (DALYs) for 291 diseases and injuries in 21 regions, 1990-2010: a systematic analysis for the Global Burden of Disease Study 2010. *Lancet*, 380(9859), pp.2197–223. Available at: http://www.ncbi.nlm.nih.gov/pubmed/23245608 [Accessed March 19, 2014].

Nakagawa-Kogan, H. et al., 1988. Self-management of hypertension: Predictors of success in diastolic blood pressure reduction. *Research in nursing & health*, 11(2), pp.105–115.

Nastos, P.T. et al., 2010. Outdoor particulate matter and childhood asthma admissions in Athens , Greece : a time-series study. , pp.1–9.

National Institue of Health, 2007. Guidelines for the Diagnosis and Management of Asthma. Available at: http://www.nhlbi.nih.gov/guidelines/asthma/asthsumm.pdf.

National Institue of Health, 1992. International Consensus Report on Diagnosis and Treatment of Asthma Participants : International asthma Preface Definition , diagnosis , and classification Directions for research. *European Respiratory Journal*.

National Institue of Health, 2010. Self-management Fact Sheet. , (October), pp.1–2.

Neidell, M. & Kinney, P.L., 2010. Estimates of the association between ozone and asthma hospitalizations that account for behavioral responses to air quality information. *Environmental Science & Policy*, 13(2), pp.97–103. Available at: http://linkinghub.elsevier.com/retrieve/pii/S1462901109001919 [Accessed March 11, 2013].

Neidell, M.J., 2004. Air pollution, health, and socio-economic status: the effect of outdoor air quality on childhood asthma. *Journal of health economics*, 23(6), pp.1209–36. Available at: http://www.ncbi.nlm.nih.gov/pubmed/15556243 [Accessed August 19, 2013].

Nettleton, S., 2006. *The sociology of health and illness*, Polity.

Neville, R.G. et al., 1996. Observations on the structure, process and clinical outcomes of asthma care in general practice. *The British journal of general practice : the journal of the Royal College of General Practitioners*, 46(411), pp.583–7. Available at: http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=1239782&tool=pmcentrez&rendertype=abstract.

Neville, R.G. et al., 2003. The economic and human costs of Asthma in Scotland. , 12(4), pp.115–119.

Newman, S., Steed, L. & Mulligan, K., 2004. Self-management interventions for chronic illness. *Lancet (London, England)*, 364(9444), pp.1523–37. Available at: http://www.sciencedirect.com/science/article/pii/S0140673604172772 [Accessed July 12, 2015].

Ng Man Kwong, G., Das, C., Proctor, A.R., et al., 2002. Diagnostic and treatment behaviour in children with chronic respiratory symptoms: relationship with socioeconomic factors. *Thorax*, 57(8), pp.701–4. Available at: http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=1746399&tool=pmcentrez&rendertype=abstract.

Ng Man Kwong, G., Das, C., Proctor, a R., et al., 2002. Diagnostic and treatment behaviour in children with chronic respiratory symptoms: relationship with socioeconomic factors. *Thorax*, 57(8), pp.701–4. Available at: http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=1746399&tool=pmcentrez&rendertype=abstract.

NHS Confederation, 2003. New GMS Contract 2003 :Investing in General Practice. Available at: http://www.nhsalliance.org/publication/view/premises-under-the-new-gms-contract/.

NHS National Improvement Projects, 2012. Improving adult asthma care: Emerging learning from the national improvement projects. *NHS Improvement*.

NHS Scotland, 2005. *BUILDING A HEALTH SERVICE FIT FOR THE FUTURE*,

Norbäck, D. et al., 2013. Mould and dampness in dwelling places , and onset of asthma : the population-based cohort ECRHS. , pp.325–331.

Norman, P., Boyle, P. & Rees, P., 2005. Selective migration, health and deprivation: a longitudinal analysis. *Social science & medicine (1982)*, 60(12), pp.2755–71. Available at: http://www.ncbi.nlm.nih.gov/pubmed/15820585 [Accessed May 10, 2014].

Northridge, M.E., Sclar, E.D. & Biswas, M.P., 2003. Sorting out the connections between the built environment and health: a conceptual framework for navigating pathways and planning healthy cities. *Journal of Urban Health*, 80(4), pp.556–568.

Nowak, D., 2006. Management of asthma with anti-immunoglobulin E: a review of clinical trials of omalizumab. *Respiratory medicine*, 100(11), pp.1907–1917.

Nozick, M., 1998. Healthy cities, healthy communities. *Canadian Dimension*, 32(3), p.40.

O.Sterner, 2010. Chemistry Health and the Environment. *Chemistry,Health and the Environment*. Available at: http://books.google.co.uk/books?id=98NB6FGzdNUC&printsec=frontcover&dq=inauthor:"Olov+Sterner"&hl=en&sa=X&ei=W-YyU4vBOcnG7Ab_4IDABQ&ved=0CDMQ6AEwAA#v=onepage&q&f=false.

ODPM, 2004. ODPM:The English Indices of Deprivation. Available at: http://webarchive.nationalarchives.gov.uk/20100410180038/http:/www.communities.gov.uk/documents/communities/pdf/131206.pdf [Accessed October 3, 2015].

Office of the Chief Statistician and Performance, 2013. SIMD review Stage 1: Conceptual issues. Available at: www.scotland.gov.uk/Resource/0043/00435850.doc.

ONS, 2011. 2011 Census. Available at: http://www.ons.gov.uk/ons/search/index.html?newquery=2011+census [Accessed February 17, 2014].

Osterberg, L. & Blaschke, T., 2005. Adherence to medication. *The New England journal of medicine*, 353(5), pp.487–97. Available at: http://www.ncbi.nlm.nih.gov/pubmed/16079372.

Ostler, K., 2001. Influence of socio-economic deprivation on the prevalence and outcome of depression in primary care: The Hampshire Depression Project. *The British Journal of Psychiatry*, 178(1), pp.12–17. Available at: http://bjp.rcpsych.org/cgi/doi/10.1192/bjp.178.1.12 [Accessed June 5, 2014].

Østrem, A., Thomas, M. & Price, D., 2008. Asthma in Practice Position Paper 4 Asthma management : The Patient ' s Perspective. , pp.9–11.

Pampalon, R. et al., 2007. Perception of place and health: differences between neighbourhoods in the Québec City region. *Social Science & Medicine*, 65(1), pp.95–111.

Parkes, A. & Kearns, A., 2006. The multi-dimensional neighbourhood and health: A cross-sectional analysis of the Scottish Household Survey, 2001. *Health and Place*, 12(1), pp.1–18.

Partridge, M.R. et al., 2006. Attitudes and actions of asthma patients on regular maintenance therapy: the INSPIRE study. *BMC pulmonary medicine*, 6, p.13. Available at: http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=1483837&tool=pmcentrez&rendertype=abstract [Accessed April 1, 2014].

Patel, M.R. et al., 2012. Asthma action plans and patient satisfaction among women with asthma. *Chest*, 142(5), pp.1143–9. Available at: http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=3494469&tool=pmcentrez&rendertype=abstract [Accessed February 3, 2014].

Paterson, C. & Britten, N., 2000. Organising primary health care for people with asthma : the patient ' s perspective. , (July 1999), pp.299–303.

Patton, M.Q., 1990. *Qualitative evaluation and research methods .*, SAGE Publications, inc.

Patton, M.Q., 2002. *Qualitative Research & Evaluation Methods*, SAGE Publications. Available at: https://books.google.co.uk/books/about/Qualitative_Research_Evaluation_Methods.html?id=FjBw20i8El4C&pgis=1 [Accessed August 25, 2015].

Pearce, J., 2012. The "blemish of place": stigma, geography and health inequalities. A commentary on Tabuchi, Fukuhara & Iso. *Social science & medicine (1982)*, 75(11), pp.1921–4. Available at: http://www.ncbi.nlm.nih.gov/pubmed/22917749 [Accessed July 16, 2014].

Pearce, J., Witten, K. & Bartie, P., 2006. Neighbourhoods and health: a GIS approach to measuring community resource accessibility. *Journal of epidemiology and community health*, 60(5), pp.389–395.

Pearce, J.R. et al., 2010. Environmental justice and health : the implications of the socio-spatial distribution of multiple environmental deprivation for health inequalities in the United Kingdom. , (April), pp.522–539.

Pearce, J.R. et al., 2011. Environmental justice and health: a study of multiple environmental deprivation and geographical inequalities in health in New Zealand. *Social science & medicine (1982)*, 73(3), pp.410–20. Available at: http://www.ncbi.nlm.nih.gov/pubmed/21726927 [Accessed August 12, 2014].

Pearce, N., Asher, I., Billo, N., Bissell, K., Ellwood, P., El Sony, A., García-Marcos, L., Chiang, C.-Y., Mallol, J. & Marks, G., 2013. Asthma in the global NCD agenda: a neglected epidemic. *The Lancet Respiratory Medicine*, 1(2), pp.96–98.

Pearce, N., Asher, I., Billo, N., Bissell, K., Ellwood, P., El Sony, A., García-Marcos, L., Chiang, C.-Y., Mallol, J., Marks, G., et al., 2013. Asthma in the global NCD agenda: a neglected epidemic. *The lancet. Respiratory medicine*, 1(2), pp.96–8. Available at: http://www.ncbi.nlm.nih.gov/pubmed/24429078 [Accessed March 21, 2014].

Pearce, N., 2000. The ecological fallacy strikes back. *Journal of epidemiology and community health*, 54(5), pp.326–7. Available at: http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=1731667&tool=pmcentrez&rendertype=abstract.

Perret, J.L. et al., 2013. The interplay between the effects of lifetime asthma, smoking, and atopy on fixed airflow obstruction in middle age. *American journal of respiratory and critical care medicine*, 187(1), pp.42–48.

Peterson-Sweeney, K. et al., 2003. Parental perceptions of their child's asthma: management and medication use. *Journal of pediatric health care : official publication of National Association of Pediatric Nurse Associates & Practitioners*, 17(3), pp.118–25. Available at: http://www.ncbi.nlm.nih.gov/pubmed/12734458 [Accessed April 21, 2014].

Phillimore, P., Beattie, A. & Townsend, P., 1994. Widening inequality of health in northern England, 1981-91. *BMJ*, 308(6937), pp.1125–1128. Available at: http://www.bmj.com/content/308/6937/1125 [Accessed May 16, 2014].

Piantadosi, BYAR, D.P. & GREEN1, A.S.B., 1988. THE ECOLOGICAL FALLACY. *AMERICAN JOURNAL OF EPIDEMIOLOGY*, Vol. 127,.

Piantadosi, S., 1988. The ecological fallacy. *American Journal of …*, 127(5). Available at: http://www.scientificintegrityinstitute.org/aje050188.pdf [Accessed July 20, 2014].

Picker Institute, 2006. Engaging patients in their healthcare. *How is the UK doing relative to other countries*, (April). Available at: http://www.researchgate.net/publication/230687397_Engaging_patients_in_healthcare/file/5046352b47bf5f0c67.pdf [Accessed December 8, 2014].

Pickett, K.E. & Pearl, M., 2001. Multilevel analyses of neighbourhood socioeconomic context and health outcomes: a critical review. *Journal of epidemiology and community health*, 55(2), pp.111–122.

Piipari, R. et al., 2004. Smoking and asthma in adults. *European Respiratory Journal*, 24(5), pp.734–739.

Ponka, A. & Virtanen, M., 1996. Asthma pollution. , 50(Supp 1), pp.62–65.

Poortinga, W., Dunstan, F.D. & Fone, D.L., 2008. Neighbourhood deprivation and self-rated health: the

role of perceptions of the neighbourhood and of housing problems. *Health & place*, 14(3), pp.562–75. Available at: http://www.ncbi.nlm.nih.gov/pubmed/17997343 [Accessed July 22, 2014].

Powell, C.V.E. et al., 2001. Successful implementation of spacer treatment guideline for acute asthma. *Archives of disease in childhood*, 84(2), pp.142–146.

Precht, D.H., Keiding, L. & Madsen, M., 2003. Smoking patterns among adolescents with asthma attending upper secondary schools: a community-based study. *Pediatrics*, 111(5), pp.e562–e568.

Propper, C. & Rigg, J., 2006. Understanding socio-economic inequalities in childhood respiratory health. *LSE STICERD Research Paper No. CASE109*.

Public Health Agency, 2012. No Title. Available at: http://www.publichealth.hscni.net/news/highlighting-importance-self-managing-asthma.

Purdy, S., 2010. Avoiding hospital admissions. , (December), pp.1–28.

Rabe, K.F. et al., 2000. Clinical management of asthma in 1999: the Asthma Insights and Reality in Europe (AIRE) study. *The European respiratory journal*, 16(5), pp.802–7. Available at: http://www.ncbi.nlm.nih.gov/pubmed/11153575.

Rabe, K.F. et al., 2004. Worldwide severity and control of asthma in children and adults: the global asthma insights and reality surveys. *The Journal of allergy and clinical immunology*, 114(1), pp.40–7. Available at: http://www.ncbi.nlm.nih.gov/pubmed/15241342 [Accessed December 8, 2014].

Rage, E. et al., 2009. Air pollution and asthma severity in adults. *Occupational and environmental medicine*, 66(3), pp.182–8. Available at: http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=2663354&tool=pmcentrez&rendertype=abstract [Accessed August 19, 2013].

Raphael, D. et al., 1996. Quality of life indicators and health: current status and emerging conceptions. *Social Indicators Research*, 39(1), pp.65–88.

Rauh, V.A., Chew, G.R. & Garfinkel, R.S., 2002. Deteriorated housing contributes to high cockroach allergen levels in inner-city households. *Environmental Health Perspectives*, 110(Suppl 2), p.323.

Reddel, H.K. et al., 2009. An official American Thoracic Society/European Respiratory Society statement: asthma control and exacerbations: standardizing endpoints for clinical asthma trials and clinical practice. *American journal of respiratory and critical care medicine*, 180(1), pp.59–99. Available at: http://www.ncbi.nlm.nih.gov/pubmed/19535666 [Accessed March 20, 2014].

Redman, B.K., 2004. *Patient self-management of chronic disease: the health care provider's challenge*, Jones & Bartlett Learning.

Reid, J.M., 2009. Excess mortality in the Glasgow conurbation: exploring the existence of a Glasgow effect.

Richardson, E. a et al., 2009. Evidence-based selection of environmental factors and datasets for measuring multiple environmental deprivation in epidemiological research. *Environmental health : a global access science source*, 8 Suppl 1, p.S18. Available at: http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=2796496&tool=pmcentrez&rendertype=abstract [Accessed March 26, 2014].

Richardson, E. a. et al., 2013. A Regional Measure of Neighborhood Multiple Environmental Deprivation: Relationships with Health and Health Inequalities. *The Professional Geographer*, 65(1), pp.153–170. Available at: http://www.tandfonline.com/doi/abs/10.1080/00330124.2012.660457 [Accessed February 10, 2014].

Richardson, G., Eick, S. & Jones, R., 2005. How is the indoor environment related to asthma?: literature review. *Journal of advanced nursing*, 52(3), pp.328–39. Available at:

http://www.ncbi.nlm.nih.gov/pubmed/16194186.

Ritz, T. et al., 2006. The asthma trigger inventory: validation of a questionnaire for perceived triggers of asthma. *Psychosomatic medicine*, 68(6), pp.956–65. Available at: http://www.ncbi.nlm.nih.gov/pubmed/17132841 [Accessed April 4, 2014].

Riva, M., Gauvin, L. & Barnett, T.A., 2007. Toward the next generation of research into small area effects on health: a synthesis of multilevel investigations published since July 1998. *Journal of epidemiology and community health*, 61(10), pp.853–861.

Roberts, S. & Button, L., 2012. Influence of social deprivation and air pollutants on serious asthma. *European Respiratory Journal*, 40(3), pp.785–788. Available at: http://erj.ersjournals.com/content/40/3/785.short [Accessed December 9, 2014].

Robertson, R., Osman, L.M. & Douglas, J.G., 1997. Adult asthma review in general practice: nurses' perception of their role. *Family practice*, 14(3), pp.227–232.

Robinson, C.L. et al., 2011. Effect of urbanisation on asthma, allergy and airways inflammation in a developing country setting. *Thorax*, 66(12), pp.1051–7. Available at: http://www.ncbi.nlm.nih.gov/pubmed/21730351 [Accessed August 19, 2013].

Rona, R.J., 2000. Asthma and poverty. *Thorax*, 55(3), pp.239–44. Available at: http://www.ncbi.nlm.nih.gov/pubmed/22391754.

Ross, C.E. & Mirowsky, J., 2001. Neighborhood disadvantage, disorder, and health. *Journal of health and social behavior*, pp.258–276.

Ross, N. a., Tremblay, S. & Graham, K., 2004. Neighbourhood influences on health in Montréal, Canada. *Social Science and Medicine*, 59(7), pp.1485–1494.

Rotter, J.B., 1966. Generalized expectancies for internal versus external control of reinforcement. *Psychological monographs*, 80(1), pp.1–28. Available at: http://www.scopus.com/inward/record.url?eid=2-s2.0-0013994747&partnerID=40&md5=967a6ba5676cddc66193599c2ca90d32.

Sakula, A., 1988. A history of asthma. The FitzPatrick lecture 1987. *Journal of the Royal College of Physicians of London*, 22(1), pp.36–44. Available at: http://www.ncbi.nlm.nih.gov/pubmed/3276885 [Accessed April 1, 2014].

Salmond, C. et al., 1999. Asthma prevalence and deprivation: a small area analysis. *Journal of epidemiology and community health*, 53(8), pp.476–80. Available at: http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=1756942&tool=pmcentrez&rendertype=abstract.

Sánchez-Borges, M., Capriles-Hulett, A. & Caballero-Fonseca, F., 2011. Asthma care in resource-poor settings. *The World Allergy Organization journal*, 4(4), pp.68–72. Available at: http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=3651059&tool=pmcentrez&rendertype=abstract.

Sandberg, S. et al., 2000. The role of acute and chronic stress in asthma attacks in children. *Lancet (London, England)*, 356(9234), pp.982–7. Available at: http://www.sciencedirect.com/science/article/pii/S014067360002715X [Accessed September 22, 2015].

Sandel, M. & Wright, R.J., 2006. When home is where the stress is: expanding the dimensions of housing that influence asthma morbidity. *Archives of Disease in Childhood*, 91(11), pp.942–948.

Sandelowski, M., 1995. Qualitative analysis: What it is and how to begin. *Research in Nursing & Health*, 18(4), pp.371–375. Available at: http://dx.doi.org/10.1002/nur.4770180411.

Saxena, S. et al., 2007. Practice size, caseload, deprivation and quality of care of patients with coronary heart disease, hypertension and stroke in primary care: national cross-sectional study. *BMC health services research*, 7, p.96.

Schwartz, S., Susser, E. & Susser, M., 1999. A future for epidemiology? *Annual review of public health*, 20(1), pp.15–33.

SCOT PHO, 2012. Asthma Prevalence. *Scottish Public Health Observatory*. Available at: http://www.scotpho.org.uk/health-wellbeing-and-disease/asthma/key-points.

Scotland, J., 2012. Exploring the philosophical underpinnings of research: relating ontology and epistemology to the methodology and methods of the scientific, interpretive, and critical research paradigms. *English Language Teaching*, 5(9), p.p9.

Scott, A. et al., 2007. *The Urban-Rural Divide : Myth or Reality? SERG Policy Brief, Number 2*,

Sellars, W., 1956. Empiricism and the Philosophy of Mind. *Minnesota studies in the philosophy of science*, 1, pp.253–329.

Segal, L. (1998). The importance of patient empowerment in health system reform. *Health Policy*, *44*(1),

Sherman, S.J. et al., 2010. The Intergenerational Transmission of Implicit and Explicit Attitudes Toward Smoking. , 45(2), pp.1–15.

Shiue, I., 2013. Associated social factors of prevalent asthma in adults and the very old in the UK. *Allergy*, 68(3), pp.392–6. Available at: http://www.ncbi.nlm.nih.gov/pubmed/23330881 [Accessed October 17, 2013].

Shouls, S., Congdon, P. & Curtis, S., 1996. Modelling inequality in reported long term illness in the UK: combining individual and area characteristics. *Journal of Epidemiology and Community Health*, 50(3), pp.366–376.

Slavin, R.E., 1995. Best evidence synthesis: an intelligent alternative to meta-analysis. *Journal of clinical epidemiology*, 48(1), pp.9–18. Available at: http://www.ncbi.nlm.nih.gov/pubmed/7853053 [Accessed September 23, 2015].

Sloggett, a & Joshi, H., 1994. Higher mortality in deprived areas: community or personal disadvantage? *BMJ (Clinical research ed.)*, 309(6967), pp.1470–1474.

Sloggett, A. & Joshi, H., 1994. Higher mortality in deprived areas: community or personal disadvantage? *Bmj*, 309(6967), pp.1470–1474.

Smith, C.J.P. et al., 2008. The impact of the 2004 NICE guideline and 2003 General Medical Services contract on COPD in primary care in the UK. *QJM*, 101(2), pp.145–153. Available at: http://qjmed.oxfordjournals.org/content/101/2/145.abstract.

Smith, G.D. et al., 1998. Individual social class, area-based deprivation, cardiovascular disease risk factors, and mortality: the Renfrew and Paisley Study. *Journal of epidemiology and community health*, 52(6), pp.399–405.

Smith, G.D. et al., 1998. Individual social class, area-based deprivation, cardiovascular disease risk factors, and mortality: the Renfrew and Paisley Study. *Journal of epidemiology and community health*, 52(6), pp.399–405.

Smith, G.D., Bartley, M. & Blane, D., 1990. The Black report on socioeconomic inequalities in health 10 years on. *BMJ (Clinical research ed.)*, 301(6748), pp.373–7. Available at: http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=1679935&tool=pmcentrez&rendertype=abstract.

Sooman, A. & Macintyre, S., 1995. Health and perceptions of the local environment in socially contrasting neighbourhoods in glasgow. *Health & Place*, 1, pp.15–26.

Stafford, M. et al., 2001. Characteristics of individuals and characteristics of areas: investigating their influence on health in the Whitehall II study. *Health & Place*, 7(2), pp.117–129. Available at: http://linkinghub.elsevier.com/retrieve/pii/S1353829201000041.

Stafford, M. & Marmot, M., 2003. Neighbourhood deprivation and health: does it affect us all equally? *International journal of epidemiology*, 32(3), pp.357–366.

Stapleton, M. et al., 2011. Smoking and asthma. *The Journal of the American Board of Family Medicine*, 24(3), pp.313–322.

Stead, M. et al., 2001. "It's as if you're locked in": qualitative explanations for area effects on smoking in disadvantaged communities. *Health & Place*, 7(4), pp.333–343. Available at: http://linkinghub.elsevier.com/retrieve/pii/S1353829201000259.

Steven, K., Morrison, J. & Drummond, N., 2002. Lay versus professional motivation for asthma treatment: a cross-sectional, qualitative study in a single Glasgow general practice. *Family practice*, 19(2), pp.172–7. Available at: http://www.ncbi.nlm.nih.gov/pubmed/11906983.

Stewart, M.A., 1995. EFFECTIVE PHYSICIAN-PATIENT COMMUNICATION AND HEALTH OUTCOMES : A REVIEW. , 152(9), pp.1423–1433.

Strachan, D.P. et al., 1994. A national survey of asthma prevalence, severity, and treatment in Great Britain. *Archives of disease in childhood*, 70(3), pp.174–8. Available at: http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=1029735&tool=pmcentrez&rendertype=abstract.

Strong, M., Maheswaran, R. & Pearson, T., 2006. A comparison of methods for calculating general practice level socioeconomic deprivation. *International journal of health geographics*, 5, p.29. Available at: http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=1524946&tool=pmcentrez&rendertype=abstract [Accessed August 19, 2013].

Strong, M., Maheswaran, R. & Radford, J., 2006. Socioeconomic deprivation, coronary heart disease prevalence and quality of care: a practice-level analysis in Rotherham using data from the new UK general practitioner Quality and Outcomes Framework. *Journal of public health (Oxford, England)*, 28(1), pp.39–42. Available at: http://www.ncbi.nlm.nih.gov/pubmed/16436452 [Accessed August 19, 2013].

Strong, M., South, G. & Carlisle, R., 2009. The UK Quality and Outcomes Framework pay-for-performance scheme and spirometry: rewarding quality or just quantity? A cross-sectional study in Rotherham, UK. *BMC Health Services Research*, 9(1), pp.1–5. Available at: http://dx.doi.org/10.1186/1472-6963-9-108.

Suglia, S.F. et al., 2010. Social and environmental stressors in the home and childhood asthma. *Journal of epidemiology and community health*, 64(7), pp.636–42. Available at: http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=3094102&tool=pmcentrez&rendertype=abstract [Accessed March 11, 2013].

Suglia, S.F., Duarte, C.S. & Sandel, M.T., 2011. Social and environmental stressors in the home and childhood asthma. *Journal of epidemiology and community health*, pp.1–16.

Sweeney, K.G. et al., 2001. A comparison of professionals' and patients' understanding of asthma: evidence of emerging dualities? *Medical humanities*, 27(1), pp.20–5. Available at: http://www.ncbi.nlm.nih.gov/pubmed/23670547.

Szefler, S.J. et al., 2008. Management of asthma based on exhaled nitric oxide in addition to guideline-based treatment for inner-city adolescents and young adults: a randomised controlled trial. *The Lancet*, 372(9643), pp.1065–1072.

Tashakkori, A., 1998. *Mixed Methodology: Combining Qualitative and Quantitative Approaches*, SAGE Publications, Inc; 1 edition. Available at: http://www.amazon.com/Mixed-Methodology-Qualitative-Quantitative-Approaches/dp/0761900713 [Accessed May 15, 2014].

Taylor, P.E. et al., 2004. Birch pollen rupture and the release of aerosols of respirable allergens. *Clinical and experimental allergy : journal of the British Society for Allergy and Clinical Immunology*, 34(10), pp.1591–6. Available at: http://www.ncbi.nlm.nih.gov/pubmed/15479275 [Accessed February 28, 2013].

Teach, S.J. et al., 2006. Indoor environmental exposures among children with asthma seen in an urban emergency department. *Pediatrics*, 117(4 Pt 2), pp.S152–8. Available at: http://www.ncbi.nlm.nih.gov/pubmed/16777831 [Accessed August 19, 2013].

Teddie, C. & Tashakkori, A., 2009. Foundations of mixed methods research.

The Guardian, 2016. Air pollution at this level for 10 more years will put a generation at risk. *The Guardian*. Available at: http://www.theguardian.com/commentisfree/2016/jan/12/air-pollution-generation-quality-motor-trade [Accessed January 19, 2016].

The Joanna Briggs Institute, 2015. *The Joanna Briggs Institute Reviewers' Manual 2015: Methodology for JBI scoping reviews*, Available at: http://joannabriggs.org/assets/docs/sumari/ReviewersManual_Mixed-Methods-Review-Methods-2014-ch1.pdf.

The Scottish Government, 2007. *Better Health,Better Care:Action Plan*,

The Scottish Government, 2012. Scottish Index of Multiple Deprivation (SIMD). Available at: http://www.scotland.gov.uk/Topics/Statistics/SIMD.

The Scottish Government, 2011. The Scottish Health Survey 2011. Available at: http://www.scotland.gov.uk/Publications/2011/09/27084018/58.

The Scottish Public Health Obsevatory, 2015. Excess mortality in Scotland and Glasgow. Available at: http://www.scotpho.org.uk/comparative-health/excess-mortality-in-scotland-and-glasgow [Accessed June 5, 2015].

Townsend, P., 1987. Deprivation. *Journal of Social Policy*, 16(02), pp.125–146. Available at: http://www.journals.cambridge.org/abstract_S0047279400020341 [Accessed May 3, 2014].

Trochim, W.M.K., 2006. Positivism and post-positivism. *Research methods knowledge base*.

Tse, M., Bauman, A. & Bridges-Webb, C., 1991. Asthma management in general practice. *Australian family physician*, 20(8), pp.1085, 1088–9, 1092. Available at: http://www.ncbi.nlm.nih.gov/pubmed/1683225 [Accessed April 22, 2014].

Tudor Hart, J., 1971. The inverse care law. *The Lancet*, 297(7696), pp.405–412.

UK Government, 2013. Index of Multiple Deprivation. Available at: https://www.gov.uk/government/statistics/english-indices-of-deprivation-2015 [Accessed January 1, 2014].

Vieira, S.E. et al., 2012. Urban Air Pollutants Are Significant Risk Factors for Asthma and Pneumonia in Children : The Influence of Location on the Measurement of Pollutants ☪. , 48(11), pp.389–395.

Villeneuve, P.J. et al., 2007. Outdoor air pollution and emergency department visits for asthma among children and adults: a case-crossover study in northern Alberta, Canada. *Environmental health : a global access science source*, 6, p.40. Available at: http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=2254596&tool=pmcentrez&rendertype=abstract [Accessed August 18, 2013].

Vincent, S.D. et al., 2006. Exasperations of Asthma: A qualitative study of patient language about worsening asthma. , (18), pp.451–454.

Vos, T. et al., 2012. Years lived with disability (YLDs) for 1160 sequelae of 289 diseases and injuries 1990-2010: a systematic analysis for the Global Burden of Disease Study 2010. *Lancet*, 380(9859), pp.2163–96. Available at: http://www.ncbi.nlm.nih.gov/pubmed/23245607 [Accessed March 19, 2014].

Vries, H. De et al., 1995. The Impact of Social Influences in the Context of Attitude, Self-Efficacy, Intention, and Previous Behavior as Predictors of Smoking Onset1. *Journal of Applied Social Psychology*, 25(3), pp.237–257.

Vrijheid, M., 2000. Health effects of residence near hazardous waste landfill sites: a review of epidemiologic literature. *Environmental health perspectives*, 108(Suppl 1), p.101.

Wainwright, N.W.J. et al., 2007. Psychosocial factors and asthma in a community sample of older adults. *Journal of psychosomatic research*, 62(3), pp.357–61. Available at: http://www.ncbi.nlm.nih.gov/pubmed/17324687 [Accessed October 17, 2013].

Walker, R.A.E., 1995. The public ' s problem with public health research. , 10(3), pp.229–238.

Wallace, R. & Wallace, D., 1990. Origins of public health collapse in New York City: the dynamics of planned shrinkage, contagious urban decay and social disintegration. *Bulletin of the New York Academy of Medicine*, 66(5), p.391.

Walsh, D. et al., 2010. It's not "just deprivation": why do equally deprived UK cities experience different health outcomes? *Public health*, 124(9), pp.487–95. Available at: http://www.ncbi.nlm.nih.gov/pubmed/20223487 [Accessed August 24, 2015].

Walter, M.J. & Holtzman, M.J., 2005. A centennial history of research on asthma pathogenesis. *American journal of respiratory cell and molecular biology*, 32(6), pp.483–9. Available at: http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=2715318&tool=pmcentrez&rendertype=abstract [Accessed April 1, 2014].

Walters, S., Phupinyokul, M. & Ayres, J., 1995. Hospital admission rates for asthma and respiratory disease in the West Midlands: their relationship to air pollution levels. *Thorax*, 50(9), pp.948–54. Available at: http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=1021307&tool=pmcentrez&rendertype=abstract.

Watson, J.P., Cowen, P. & Lewis, R. a., 1996. The relationship between asthma admission rates, routes of admission, and socioeconomic deprivation. *European Respiratory Journal*, 9(10), pp.2087–2093. Available at: http://erj.ersjournals.com/content/9/10/2087 [Accessed March 11, 2013].

Watt, G., 2011. Patient encounters in very deprived areas. *The British journal of general practice : the journal of the Royal College of General Practitioners*, 61(583), p.146. Available at: http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=3026163&tool=pmcentrez&rendertype=abstract [Accessed August 19, 2013].

Weitzman, M., Gortmaker, S. & Sobol, A., 1990. Racial, social, and environmental risks for childhood asthma. *American journal of diseases of children (1960)*, 144(11), pp.1189–94. Available at: http://www.ncbi.nlm.nih.gov/pubmed/2239856 [Accessed September 22, 2015].

Wheeler, B.W. & Ben-Shlomo, Y., 2005. Environmental equity, air quality, socioeconomic status, and respiratory health: a linkage analysis of routine data from the Health Survey for England. *Journal of Epidemiology and Community Health*, 59(11), pp.948–954.

Whitehead, M., Scott-Samuel, A. & Dahlgren, G., 1998. Setting targets to address inequalities in health. *Lancet*, 351(9111), pp.1279–82. Available at:

http://www.sciencedirect.com/science/article/pii/S0140673698033029 [Accessed December 10, 2014].

Whittemore, R. & Knafl, K., 2005. The integrative review: updated methodology. *Journal of advanced nursing*, 52(5), pp.546–553.

WHO, 2007. No Title. *World Health Organization Fact Sheet No: 207*. Available at: http://web.archive.org/web/20110629035454/http://www.who.int/mediacentre/factsheets/fs307/en/.

WHO, 2011. No Title. *WHO*. Available at: http://www.who.int/respiratory/asthma/causes/en/.

WHO, 2005. Preparing a health care workforce for the 21st century :THE CHALLENGE OF CHRONIC CONDITIONS. *Noncommunicable Diseases and Mental Health Cluster Chronic Diseases and Health Promotion Department*.

WHO (WorldHealthOrganisation, 1986. Ottawa Charter for Health Promotion. Adopted at the First International Conference on Health Promotion,Ottawa,on 21 November198. *Ottawa Charter for Health Promotion. Adopted at the First International Conference on Health Promotion,Ottawa,on 21 November1986*. Available at: http://www.euro.who.int/ data/assets/pdf_file/0004/129532/Ottawa_Charter.pdf.

Whynes, D.K. et al., 2003. Colorectal cancer, screening and survival: the influence of socio-economic deprivation. *Public health*, 117(6), pp.389–95. Available at: http://www.sciencedirect.com/science/article/pii/S003335060300146X [Accessed March 3, 2016].

Wiener-Ogilvie, S. et al., 2007. Do practices comply with key recommendations of the British Asthma Guideline? If not, why not? *Primary care respiratory journal : journal of the General Practice Airways Group*, 16(6), pp.369–77. Available at: http://www.ncbi.nlm.nih.gov/pubmed/18026674 [Accessed April 1, 2014].

Wiener-Ogilvie, S. et al., 2008. Practice organisational characteristics can impact on compliance with the BTS/SIGN asthma guideline: qualitative comparative case study in primary care. *BMC family practice*, 9, p.32. Available at: http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=2427031&tool=pmcentrez&rendertype=abstract [Accessed April 22, 2014].

Wikgren, M., 2005. Critical realism as a philosophy and social theory in information science? *Journal of Documentation*, 61(1), pp.11–22. Available at: http://www.emeraldinsight.com/journals.htm?issn=0022-0418&volume=61&issue=1&articleid=1465005&show=html [Accessed May 2, 2014].

Wilcox, R. & Knapp, A., 2000. Building communities that create health. *Public Health Reports*, 115(2-3), p.139.

Williams, A., 2009. Therapeutic landscapes as health promoting places. *A companion to health and Medical geography*, pp.207–223.

Williams, M. V, Baker, D.W., Honig, E.G., et al., 1998. Inadequate literacy is a barrier to asthma knowledge and self-care. *Chest*, 114(4), pp.1008–1015. Available at: http://dx.doi.org/10.1378/chest.114.4.1008.

Williams, M. V, Baker, D.W., Parker, R.M., et al., 1998. Relationship of functional health literacy to patients' knowledge of their chronic disease: a study of patients with hypertension and diabetes. *Archives of internal medicine*, 158(2), pp.166–172.

Wilson, 1974. Pathophysiology of Asthma. , pp.463–470.

Wolf, F. et al., 2008. Educational interventions for asthma in children (Review). , (4). Available at:

http://onlinelibrary.wiley.com/doi/10.1002/14651858.CD000326/pdf/standard [Accessed September 20, 2013].

Wright, R.J., Rodriguez, M. & Cohen, S., 1998. Review of psychosocial stress and asthma: an integrated biopsychosocial approach. *Thorax*, 53(12), pp.1066–74. Available at: http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=1745142&tool=pmcentrez&rendertype=abstract.

Wright, R.J. & Subramanian, S. V, 2007. Advancing a multilevel framework for epidemiologic research on asthma disparities. *Chest*, 132(5 Suppl), p.757S–769S. Available at: http://www.ncbi.nlm.nih.gov/pubmed/17998340 [Accessed October 17, 2013].

Yin, R.K., 2003. *Case Study Research: Design and Methods*, SAGE Publications. Available at: http://books.google.co.uk/books/about/Case_Study_Research.html?id=BWea_9ZGQMwC&pgis=1 [Accessed May 17, 2014].

Young, M. & Wilmott, P., 1957. *Family and kinship in East London*, Routledge.

Zaher, C. et al., 2004. Smoking-related diseases: The importance of COPD. *International Journal of Tuberculosis and Lung Disease*, 8(12), pp.1423–1428.

Appendix 1: Participant Invitation Letter

Date:

Research Project – Exploring the Socio-environmentalcontext in the Prevalence and Management of Asthma at Scottish General Practices

I am Dr Shiraz Sheriff, a third year PhD student at the University of Dundee. My research, funded by the Centre for Environmental Change and Human Resilience (CECHR) and supported by the Social Dimensions of Health Institute (SDHI), both which are based at the University of Dundee, explores how contextual factors present in an environment *(e.g. Individual, Social, Environmental*) have the potential to shape the prevalence and management of Asthma in General Practices in Scotland.

I have already performed preliminary statistical analysis based on available data and to further gain more meaningful insights to understand some of the contextual factors underpinning Asthma care, I need to conduct a qualitative research study.

I am writing to enquire if your organisation would be able to contribute to my research by participating in my case study which will include a short face to face interview of approximately forty five minutes duration with a Practitioner/Nurse overseeing Respiratory diseases at the General Practice interpreting from their perspectives and experience in managing Asthma patients. I have already organised the questions in order to keep our meeting focused and in time, knowing the pressures associated. My questions will focus on understanding how the environmental exposures shape Asthma care and management.

I would be very grateful if you would give this study your consideration and I hope that the General Practice will be able to support this project which could provide a key inference for a chronic disease like Asthma. I would appreciate if you could indicate if and how you would prefer to be contacted about the study by completing the return slip below and returning it in the envelope provided. Further information is provided in the enclosed research summary.

Thank you for considering and discussing this study with the GP's and Nurses in your practice.

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Yours sincerely,

Dr Shiraz Sheriff

Appendix 2: Study Information Sheet.

Study Information Sheet

This study seeks to explore how the socio-environmentalcontext in an area shapes the prevalence and management of Asthma at General Practices in Scotland.You are one of a group of General Practices / Organisations in Scotland being asked to take part in the research. Before you decide whether or not to you wish to take part please read the following and contact me if you would like to discuss it further.

What is the purpose of this study?

The aim of this study is to explore and understand how socio-environmentalfactors present in an environment has the potential to shape the prevalence and management of Asthma in General Practices located in Scotland. This study will also explore and interpret area exposures and management perspectives from the different stake holders involved in Asthma care (General Practitioners, Nurses, Community Health Workers, Asthma Support Group Workers, Social Workers, Local Council official and Health Board official in charge of health).

Why have I been chosen?

The General Practice I am interested in to involve in my research participated in an Asthma Audit Study for the Quality Outcomes Framework during the period of 2001 -2006. The perspectives offered by the health care personnel attached to the General Practice, Local Asthma Support Group Workers, Social Workers, Local Council Official in charge of Health and Health Board Official involved in Respiratory Care would be helpful in interpreting one facet of a neighbourhood scan that I will undertake to identify factors that can influence patient exposures in an area.

Do I have to take part?

No.It is completely upto you .Should you agree to take part, you are free to withdraw from the study at any time, without having to give a reason.

What will the Study involve?

Case study method will be used to understand the views of the stake holders involved. I will therefore be seeking to conduct short interviews with a range of practitioners within the General practice /Asthma Support Group Worker/Community Health Workers/Local Council Officials in charge of Health/Health Board Officials involved in Respiratory Care.

Interviews will take place at your place of work at times suitable for you. The interviews will last no more than forty five minutes and with individual consent, will be recorded so that nothing important is missed.

What are the possible benefits of taking part?

As Asthma care increases in relevance within the NHS, it is important to understand how useful the results from this study will help to improve future Asthma patient care strategies and approaches to self-management especially from urban deprived neighbourhoods.

Will my taking part in this study be kept confidential?

The information that you provide will be strictly anonymous and confidential. The Information will be stored using study numbers and pseudonyms, and you and your practice name will not be used. No information about any single individual or organisation will be available to any other person apart from the researcher and his academic supervisor. All the transcripts and digital recordings of interviews will be destroyed after the completion of the research.

What will happen to the results of the study?

Findings from the study will be shared with the NHS, Asthma UK, Lung and Asthma Information Agency and the British Thoracic Society. Opportunities will also be sought to publish in academic journals and present at conferences and seminars. I can if requested, provide your practice with a short summary report of the findings from your practice.

Who is organising and funding this research?

The study is funded by the Centre for Environmental Change and Human Resilience (CECHR) and supported by the Social Dimensions of Health Institute (SDHI), both which are based at the University of Dundee.

Who has reviewed the study?

The study has been reviewed by senior researchers from CECHR and SDHI within the University of Dundee.

Thank you for reading this information. Please do not hesitate to contact me for further information regarding the study.

Dr Shiraz Sheriff
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Appendix 3: Consent Form

CONSENT FORM

Title of Project: Exploring the Socio-environmentalcontext in the Prevalence and Management of Asthma at Scottish General Practices

Name of Researcher: Shiraz Sheriff

1. I confirm that I have read, and that I understand, the Study Information Sheet, dated….. I have had opportunity to consider the information, ask questions about the study, and have had these answered satisfactorily.	
2. I understand that my participation is voluntary and that I am free to withdraw at any time from the interview, without giving any reason.	
3. I consent to taking part in a face to face interview with the researcher. 4. I consent to the face to face interview with the researcher being audio taped. 5. I understand that any quotations or other results used in the writing up the study findings will not be identifiably attributed to me or the practice and I agree to the inclusion of quotations or other results in reports about the study.	

I agree to take part in the study.

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Name of Participant **Signature and Date**

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Researcher **Signature and Date**

Appendix 4: Interview Topic Guide

Location:

Interviewee:

Date: Interviewer:

Interview Matrix

Theme	Awareness	Problems	Propositions
Contextual Factors 1.Understanding Perceptions of Stakeholders (Practitioners,Nurses,Health Workers, Support Group workers, Local Council Official and Health Board Official)	• Environmental • Socio-economic • Psychosocial • Individual	• Potential Barriers • Beliefs • Behaviours	• Support Structures • Promotion • Possibility of Goals and Intervention
Asthma Care and Self-management Support 1.Exploring what influences management and self-management plans uptake for Asthma care from a stake holder' s perspective	• Importance • Assumptions • Impacts	• Compliance • Efficacy	• Improved outcomes • Target Groups